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Totalitarian War

The Threat of Swift Aggression to Collective Security

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A LITTLE over a hundred years ago, there died in Breslau the German military philosopher Gen. Karl von Clausewitz, who left behind him an unfinished manuscript entitled "Vom Kriege". Although this work was published in 1832 by his widow, for some thirty years it had little influence upon military thought; then, suddenly, it became the new testament of war. Now the greatness of Clausewitz lay in the fact that he was a realist and, though he lived in a politically romantic age, in outlook he was far more closely related to the scientist than to the normal military historian. He looked upon war as it was, and having scientifically examined it without prejudice, he wrote of it as he really believed it to be.

Today his philosophy is still very much alive, and though I cannot outline it here, the following quotations will give a fairly clear picture of its leading tenets: "War is only a continuation of state policy by other means" . . . "War is not merely a political act, but also a real political instrument, a continuation of political commerce" . . . "War is only a part of political intercourse, therefore by no means an independent thing in itself" . . . . "Is not war merely another kind of writing and language for political thought?" . . . . "If war belongs to policy, it will naturally take its character from thence. If policy is grand and powerful, so will also be the war."

Further still: "War is an act of violence pushed to its utmost bounds" . . . . "The more is war in earnest, the more is it a venting of animosity and hostility" . . . . "The best strategy is always to be strong" . . . . "A war should be waged with the whole weight of the national power" . . . . "There is nothing in war which is of greater importance than obedience."

Now whether it is palatable to us or not, war remains as real "a political instrument" as it was between the years 1870 and 1914. Therefore, how this instrument will be used depends just as much upon present political theories as the use of the tools in a carpenter's bag depends upon the ideas in the carpenter's head. Consequently, if we wish to understand what war means today, we must set aside all romanticism regarding what we would like the world to be, and look political systems in the face. First of all, we must realize that the next war, when it comes, will find its origin in a clash between political systems. Secondly, we must realize that the way it will be fought will depend upon the ideas underlying these systems as much as upon the weapons used. In fact, these ideas will, so to say, animate these weapons. Thirdly, we must remember that in this scientific age weapon power is developing daily, and fourthly, that this development in what may be called "lethics" will have a pronounced influence upon politics.

TO begin with, what are the fundamental differences between political systems today? Obviously here I must generalize; yet to do so is not difficult. The differences are those which have always existed: on the one hand stand the romanticists and on the other the realists. The first still draw their inspirations from the French Revolution, and the second from the scientific, rather than the industrial revolution, which was but one of its by-products. Whilst the leading object in the former group, namely the establishment of the League of Nations, is in essence nothing more than an extension in idea of Rousseau's "noble savage", that of the latter is the scientific organization of a nation in a totalitarian state. In the democratic system, which is related to the romanticists, "freedom of the individual" are the watchwords; but in the autocratic, which is related to the realists, they are, "freedom of the State". Though both in their own ages are commonsense systems, the democratic is related to the epoch of handcraftsmen, and the autocratic to that of factory workers. In the one, individuality is as essential as is authority in the other. So, when we talk of liberty, we should remember this; for liberty is not a patent which must not or cannot be infringed; it varies with each age and the way of living which each age engenders.

Inwardly, the change-over from the democratic system to the autocratic, that is, from a system of government found suitable in an agricultural age to a system thought suitable in a scientific age, was in full force during the last quarter of the nineteenth century, and was largely developed from the philosophy of Hegel. Outwardly, it was so little realized, that Sorel, the spiritual father of Mussolini, finds no mention in either the *Encyclopædia Britannica* of 1911 or in the "Cambridge Modern History", which goes to show how little are vital movements recognized during the years of their youth. Then came the World War, and with it not only the military but the political collapse of the defeated Powers,

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as well as that of two of their great opponents—Russia and Italy.

In its turn, so little was this realized by the victors, that instead of making the peace safe for democracy by the terms of their treaties, which were autocratically imposed, they made a return to the democratic system in the defeated countries impossible, and in particular they imposed upon Germany a veritable despotism of poverty. This, with the occupation, in 1923, of the Ruhr—that coping stone of desolation—inevitably led to a complete destruction of the freedom of the individual idea. No man, woman, or child in Germany was free—except to starve. Consequently, with financial bankruptcy there developed a moral bankruptcy, with the result that power passed lock, stock, and barrel into the hands of the state—the bureaucracy which, failing to utilize that power, blazed the trail for Hitler.

WHEN he came into power, he found himself the focal point of that potential spirit of rejuvenation which had been for over ten years slumbering in the heart of every true German. And as Carlyle, that shrouded prophet of autocracy, exclaimed nearly a hundred years ago: "What he says, all men were not far from saying, were longing to say. The Thoughts of all start up, as from painful enchanted sleep, round his Thought; answering to it, Yes, even so!" It was not that Hitler possessed a phenomenal intellect, but that he was the rational noumenon of Germany, that thing-in-itself, that cause of German greatness—and be it remembered at heart the Germans are a profoundly mystical people. Everything fitted him to the occasion: the misery which surrounded his countrymen—the hope he detonated within them; the collapse of the economic system—the energy which would have to be concentrated to rebuild it; even his ignorance and lack of education, for these freed him from past systems and theories and drove his impetuous spirit onward toward the future.

Hitler had passed through the war as an impressionable youth; he had watched its sordidness, its slowness, and its devastation, and during the miserable years which followed it, he absorbed its grim lessons. He realized that had Germany, in 1914, been better prepared politically, morally, economically, industrially, and militarily, she would have won the war in three weeks, and had she done so, all the agonies of a long war and all the degradation and chaos of the peace which must always follow such a conflict would have been avoided. Having witnessed the destruction of his fatherland, he became spiritualized by what was to become the cornerstone of his philosophy; namely, irrespective of thought, deed, or consequence, any man who was unwilling to sacrifice all in order to prevent the repetition of such a catastrophe blasphemed against the spirit of Germany.

When this spiritual fact is grasped, his actions become logical; for if the self-preservation of one's country is accepted as the highest of moral obligations, then it follows that to secure it is a righteous work. What did he do? He set out to restore the national unity, dignity, and discipline. He determined upon creating a self-supporting nation defended by fighting forces of the most modern kind. That he wanted war is absurd, for war could not gain for him national resurrection. What he wanted was the dignity of a strong and prosperous peace. Yet, being a realist as well as an idealist, understanding that this is a warlike age, the one thing he feared was not war, but a war like the last one.

Instead of believing, like Marx, that man is motivated by his material needs, he realized that above all, in this present age, he is moved by the grandeur of the national spirit, and in order to sustain it he is willing to sacrifice personal liberty and life itself. Looking upon the nation as a divine incarnation, he has striven for unity in building his totalitarian state. He saw that a new spirit was wanted, and that because it was impossible to attain it without a restoration of the national dignity, he tore up the treaty of Versailles, which to him was a gangster's imposition. He saw that unity was impossible without national discipline; hence his regimentation of German life and his return to conscription. Also he saw that national self-sufficiency was the basis of modern war, therefore he strove after autarchy. Finally, he saw that this new national structutre would be built upon sand unless it was founded upon so powerful an air force and army that, during its construction, no nation or group of nations would dare to attack it. He has never believed that everything can be accomplished by force, but that in this age of power everything must be founded upon it.

REMEMBERING that what he feared most was a repetition of a war like the last one, it was impossible for him to join hands with those states which constituted the League of Nations. Not only because they insisted upon adhering to the terms of the treaty of Versailles, but because they feared the type of war which would be waged with the more scientific weapons. It was on account of this they determined that should there be another war, it should follow in the footsteps of the last one—the war which had destroyed Germany. That this was so can be seen clearly, not only in the economic sanctions laid down in the Covenant of the League, which, as I will show, are inoperative except in a long war, but in every disarmament conference held since 1919. In all these efforts the democratic Powers have attempted to abolish or restrict the use of the so-called weapons of aggression, so that the next war might be long-drawn. In this the U.S.S.R. has supported them, because the Communist dictatorship knows perfectly well that another long war will end in Bolshevizing Europe.

We see here not only a clash between two incompatible political systems, but also between two variant military ideas. Whilst the democratic nations are harking backward in politics and war, Germany is striving forward. Whilst the former have so far attempted to restrict the new weapons (for without such a restriction collective security becomes most difficult since it is security by collection—that is to say, it takes time to collect it) the latter has, during the last few years, worked day and night in preparing to exploit them. Yet it is true that these weapons, as the democratic nations seem to have suspected, have become so powerful today, that for the full development of their power in war surprise is necessary; and if full surprise is gained, victory and defeat may be so rapid that collective security and the application of sanctions, either economic or military, will in the end become impracticable.

We arrive therefore at a contradictory situation: totalitarian tactics, as I will call the new method of fighting, are being forced upon the democratic Powers for national preservation. These Powers, politically, and consequently strategically, are the less suited to develop them, because war being a political instrument, the use of such tactics will depend largely upon

political theory. If the democratic nations are compelled, as they would seem to be, to adopt totalitarian tactics, then, unless they become politically totalitarian, they will fight at such a disadvantage that in another war their defeat is all but assured.

This influence of the development of scientific weapons of war upon politics is one which is so little understood that I will attempt to elaborate it in the remainder of this article.

FIRST, let us get the leading military facts clearly in focus. The seed of the totalitarian political system was sown by science during the last century. Barely had the age of science opened, than Clausewitz produced the first great scientific treatise on war. For thirty years little notice was taken of it. And why? Because it was impossible to develop it on anything like a full scale until railway construction had advanced. The reason for this was that the putting of the "nation-in-arms" idea into full force demanded a new system of supply, and the railway created it. In the Austro-Prussian War of 1866, and still more so in the Franco-Prussian of 1870-1871, what do we see? The rapid development of railway strategy; the increase in size of armies following increased power of supply. Then, in 1914-1918, what do we see? A complete breakdown of this strategy because, although railways can supply armies of millions, they cannot create supply. The simple "nation-in-arms" idea had in fact become complex, and in order to render it operative it had to be superimposed upon the idea of a nation of war workers: these two ideas together pushing the theory of war on to its totalitarian path.

Though we know today that the Allied Powers won the war mainly through the blockade, there no longer can be any doubt that the more important and effectitve weapons were the airplane, tank, gas, and the submarine and not the traditional ones. We know also that it was these weapons which were forbidden the defeated Powers by the peace treaties, and that, once these treaties were signed, the victorious Powers, feeling secure, largely scrapped their own and returned to the traditional system of warfare.

When Hitler gained power, what did he do? Finding himself faced by a tactical slate washed clean by the peace treaties, he went straight back to Clausewitz and rationalized him. To understand this, let the reader compare the extracts I have quoted from his "On War" with the following statements made by Hitler and Ludendorff.

The first says: "The future of a movement is dependent on the fanaticism, the intolerance even, with which its adherents defend it as the one right course" . . . "The cruelest weapons were humane if they conduced to a speedier victory" . . . . "If I were going to attack an opponent . . . . I shouldn't negotiate for months beforehand and make lengthy preparations, but—as I have always done throughout my life—I should suddenly, like a flash of lightning in the night, hurl myself upon the enemy."

And the second: "War and politics are subservient to the people's instinct for self-preservation, but war is the supreme expression of the people's will to live. Therefore politics must be subservient to warfare" . . . . "The twentieth century will one day be described by historians as the century of war. Formerly, in the so-called civilian period, war was an interruption, a mere incident. Mankind thought it could suppress war, but now, on the contrary, war has emancipated itself from mankind. War has become a form of existence with the same rights as peace."

The sole difference, which is certainly an important one, is that whilst Clausewitz looks upon war as "a continuation of political commerce", the totalitarians look upon it as its fountain-head. Yet the relationship between the two theories is intimate and logical so long as in a scientific age the causes of war remain virulent. The theory of the latter is, however, so big with disaster that, I myself believe, it will compel the nations to abandon their existing hypocrisies and greeds and examine these causes scientifically.

I WILL now turn from theory to fact, for in this unthinking age it is fact alone which convinces. The World War did not last long enough for any but a few clear-sighted students to deduce from it the probable nature of the next war. Yet since that war was fought another has been waged; namely, the Italo-Abyssinian. Does it reveal to us any facts? I think it does, and more especially so since it was not a simple duel between two belligerents, but one complicated by the participation of the League of Nations, the adherents of which, always excepting the U.S.S.R., either do not believe in or fail to appreciate the potentials of totalitarian war.

On the one side we find Mussolini, Fascist and, consequently, realist; on the other, not the Negus, but the League of Nations which supported him. In other words, a totalitarian state ranged against the adherents of the collective system. Had the League been out of the picture, the war would, so I think, have shaped its course on conventional lines; that is, like most colonial wars, it would have dragged on for several years, and my reason for thinking so is that when it opened I do not believe Mussolini had any but a vague idea of what totalitarian warfare meant. Instead, I am of opinion that his intention was to hoist the League by its own petard. That is to say, to open hostilities with such strength that his enemy would not dare to offer him battle, but would retreat before his army so that he would be enabled to occupy district by district, buy over the Rases, or local governors, and then, by means of plebiscites prove to the League that the Abyssinians (through self-determination) favored Italian occupation and rule.

That this was so I am convinced, for when in the middle of October, 1935, I arrived in Eritrea I was confronted by what may be called an armed political demonstration more so than by an operation of war. I found a large army, some 150,000 strong, strung out on a wide front, and commanded by General de Bono, a politically minded soldier. There was no fighting; yet there were many surrenders, and everything was being done to propitiate the inhabitants, such as paying for all damage to crops, etc., and allowing them to retain their rifles.

Whether in the end this system of armed peaceful penetration would have succeeded I cannot say, but what I can say is this: directly sanctions came into force, on November 18th, the whole nature of the war in Tigré suddenly changed. First, De Bono was replaced by Marshal Badoglio, the most skillful soldier in Italy; secondly, the Abyssinians, stimulated by the thought that the League was now their full-hearted ally, broke through the Italian right wing, which, on account of its faulty distribution, was compelled to retire some eighty miles.

In December, the position of the Italian forces, on account

of the guerilla war then being waged against their communications, was a precarious one; so much so that the adherents of the League, realizing that partial sanctions were unlikely to bring the war to an end, urged their extension to oil. At once this precipitated the second crisis, for were sanctions imposed, since at this time in Eritrea there were only between three and four months' stocks of this fuel, Italy would be compelled to abandon the war unless it could be terminated before they were exhausted. This, in all probability, would have meant the downfall of Mussolini, or certainly such a crushing blow to Italian nationalism that possibly it never would have recovered from it. What was the result? Directly the Italian national spirit was threatened, and not merely the food supply or the financial resources of the people, the war took on a totalitarian form. All difficulties, all conventions, treaties, and rules of war were leaped, and suddenly the most ruthless conflict was opened.

What Mussolini's instructions to Marshal Badoglio were, I cannot say; but there can be little doubt that they must have been, "annihilate your enemy". Seeing what this meant under a dictatorship, whatever the situation in Tigré might be, Marshal Badoglio had forthwith to take action. Strange as it may seem, his enemy at once assisted him in doing so. Instead of the Abyssinians continuing their guerilla war, their minor successes having intoxicated them, they sought battle. This was exactly what the Marshal wanted in order to comply with the Duce's instructions. Egging them on and so compelling them to concentrate and offer him a human target, he struck. Pouring high-explosive and gas bombs upon them, not only was the target annihilated, but the terror of his attack swept over the country like an avalanche.

Now the point of greatest interest in this amazing campaign is not its rapidity but its initiation, because from it was this rapidity developed. Had the Italian Government been democratic instead of autocratic, my opinion is that there would have been much talking, lobbying and conferencing before anything like totalitarian tactics were adopted. In fact, following traditional politics, they would have been compelled to develop a traditional strategy. This would have meant either a long-drawn-out war, in which economic sanctions would have by degrees become effective and would have led to the collapse of Italy and the probable Bolshevization of that country; or it would have meant the application of military sanctions in the form of an embargo on oil, which would have led, but more rapidly, to similar results. The main lesson therefore is, that had not Mussolini for self-preservation been compelled to adopt the totalitarian way of waging war, he would have lost.

Though democratic governments may not learn this lesson, it is too much to be expected that totalitarian nations will not take it to heart. The proof of the pudding is in the eating, and whilst a year ago the totalitarian strategy and tactics were based almost entirely upon theory, now they stand upon fact. Though it may be said that a war in Europe, between nations similarly armed, will be very different from a war between a modern army and an ill-armed barbaric horde, it should not be overlooked that the fullest effect of totalitarian war can be attained only when waged against a highly civilized country. The reason for this is that its leading tactical idea is to strike at the civil will, and in such countries only is this will concentrated in great targets easily attackable from the air. In fact, Abyssinia being so difficult a country to attack by this method, the operations waged there accentuate and in no way minimize the stupendous power of such attacks in Europe.

ALSO must another point be considered; namely, that though the Italo-Abyssinian war was opened by no declaration, the superiority of Italian weapon power was so great that the time to launch the totalitarian attack rested entirely with Mussolini. When similarly organized European nations are at loggerheads this condition will not hold good. In fact, the nearer the belligerents coincide in striking power, the more vital does surprise become. So vital, that a time is approaching when the first blow may well be the last. In other words: whilst the war of 1914-18 consisted in a series of long-drawn-out, inconclusive encounters, the next may possibly consist of one battle lasting but a few hours.

In such a war, what place is there for the cumbersome machinery of the League, with its slow-moving sanctions and its collective security, unless its adherents subscribe fully to totalitarian warfare and keep great air forces ready mobilized for instantaneous action? Even should they agree to do so, which will mean years and years of talk unless they base their totalitarian tactics on totalitarian politics, will even this secure them unless these peoples are endowed with the totalitarian discipline?

Thus I arrive at the fundamental lesson of this study, which is in no sense a new one, yet one which seems to have been forgotten by the democratic Powers; namely, as Lord Bacon wrote in his essay on "The True Greatness of Kingdoms and Estates": "Walled towns, stored arsenals and armories, goodly races of horse, chariots of war, elephants, ordnance, artillery, and the like: all this is but a sheep in a lion's skin, except the breed and disposition of the people be stout and warlike. Nay, number itself in armies importeth not much, where the people are of weak courage; for, as Virgil saith, 'It never troubles a wolf how many the sheep be' ". Whilst in the old form of war it is realized that an army without discipline is no more than an armed rabble, in the new, it is realized that this discipline must be extended to the nation as a whole, that is in its totality.

Strange as it may seem, I believe that the airplane more so than any other factor will compel all democratic countries, certainly in Europe, to adopt in one form or another the totalitarian politics; that, whilst in the last century, war was the instrument of politics, today, politics have become the instrument of war, and will remain so until in their totality European nations cultivate a new discipline. Further, I believe that if this discipline can shield the civil will, not necessarily from attack, but from moral collapse, then totalitarian warfare will have lost its *raison d'être,* and a new political conception will emerge. Where, it seems to me, the democratic Powers have gone astray in their attempts to establish world peace, is that they have looked upon collective security as an economic problem and a problem of force, when in fact it is at bottom a moral problem and a problem of discipline. Instead of anathematizing, they should learn from their totalitarian opponents; for, though their system of politics appears outwardly to be the apotheosis of force, within it palpitates a new spirituality—the control of human instincts and their compulsion under will to assume a disciplined form. As in these instincts lurks the soul of strife, in spite of the prevailing gloom there is hope for the morrow.

Grand Strategy of 1914-1918

Its Effect on Future Industrial Mobilization

By W. D. Puleston*

THE cause of the World War was the conflict of interests between Germany and England in Western Europe and between Austria and Russia in Eastern Europe. It was made more certain by the desire of France to regain Alsace and Lorraine, and by England's necessity of preventing France from being crushed by Germany. European statesmen worked up until the last minute to prevent war and, so far as I have been able to determine, they worked sincerely and devotedly. One of the biggest fallacies concerning the war is that it was deliberately provoked by either statesmen or military officials. This is an important fact to ponder, because if the statesmen of 1914 brought on the war, a change of statesmen might be a sure preventative of future wars. But if not, if the experienced statesmen of 1914 could not prevent a conflict of interests bringing on the war, it will be correspondingly difficult for future statesmen to prevent future war.

If we are ever going to approach the study of war in the same detached manner that a modern physician studies the causes of disease, we will have to rid our minds of the obsession that Old World statesmen, without any feeling for their fellow citizens, deliberately plunged European states into conflict.

In the decade before the war, the lines between the two European alliances were drawn tighter, and from 1912 it was plain that whenever war started the grouping would be, on one side, the Central Powers—Germany, Austria, and probably Turkey; on the other side, England, France, Russia, to a limited degree Japan, and probably Italy. The reasons for this grouping are many, but they were perfectly evident before 1914, and the strategy of the war was based on this assumption. It followed, therefore, that the World War strategy was the strategy of alliances, not of nations. Further, it comprehended huge armies and fleets, so it was always a combined strategy of land and sea forces.

When the war commenced, Germany and Austria were bound by a treaty that provided for common action during the war. Germany, on account of her greater strength, assumed the diplomatic leadership, and as Turkey and Bulgaria joined they accepted German leadership. No formal alliance existed between the entente states until September, when Grey negotiated the secret treaty known as the London Pact, which provided for a division of the expected spoils of war and agreed that no state would make a separate peace. The states of both the opposing alliances were extremely loyal to their agreements; rarely in history has there been such steadfast allegiance to alliances as was shown during the World War.

Germany, knowing that France and Russia would be against her, hoped to strike down France before Russia could mobilize. France and Russia, realizing that this was probably the plan of Germany, agreed to attack Germany simultaneously and as rapidly as possible in order that she could not engage them separately. On account of the great numerical strength of the Russian Army, Russia also proposed to take the offensive against Austria at the same time. Austria would do her utmost to stop Russia.

On the sea, the strategy was as self-evident and as clearly understood. Great Britain, assisted by the Allied fleets, would operate to command the sea in order that Allied vessels might be protected and enemy vessels destroyed or captured, and to support overseas expeditions, particularly the British Expeditionary Force to France. The German fleet was given a rôle subordinate to its army, and was required to "support its army in fighting a superior enemy on two fronts." The reasons Germany subordinated her navy were to secure the Baltic Sea, which gave her access to the raw materials of Norway, Sweden, and Denmark, and to protect her North Sea frontier, so that troops could be released for the offensive in France. The French fleet was given the task of securing the Mediterranean. This involved blockading the Austrian fleet. One of the first duties of the French Navy in the Mediterranean was to insure the passage of the French African troops to France. Assisted by the British Mediterranian Fleet they accomplished this task very successfully in spite of the efforts of the German cruisers GOEBEN and BRESLAU to prevent the passage of these troops.

In like manner one of the first duties of the British Grand Fleet was to secure the passage of the British Expeditionary Force to France. This was quietly and successfully accomplished in the first six weeks of the war. When this was done, England had completely carried out her prewar pledges to France, which included the reënforcement of the French Army with her Expeditionary Force and the protection of the French Atlantic coast from the German fleet. The Japanese fleet controlled the Far Eastern waters and relieved the British fleet of responsibility in those far-off regions. This was an important contribution by the Japanese Navy and was especially valuable in the early days of the war. By the end of 1914 the Allied fleets were in complete control of the sea. It should be emphasized that it was the *Allied* fleets that controlled the seas. The British fleet alone was insufficient for this task.

The German high command expected to crush France quickly and believed it could accept the loss of its merchant marine and foreign trade—a supposedly temporary loss that would be well compensated for by the crushing of France and the permanent gains she expected to make on land. Germany was not able to crush France, but was able to occupy a large part of the industrial area of France. The German Army proved so much stronger than the French Army that Great Britain, who had only expected to contribute a small professional army reënforced by volunteers, was driven to create a huge volunteer army and eventually to conscription. Germany, who expected to win the war on the land, was finally driven to undertake to win it on the sea by the unrestricted use of her submarines. This and its aftermath, as we know, brought the United States into the war.

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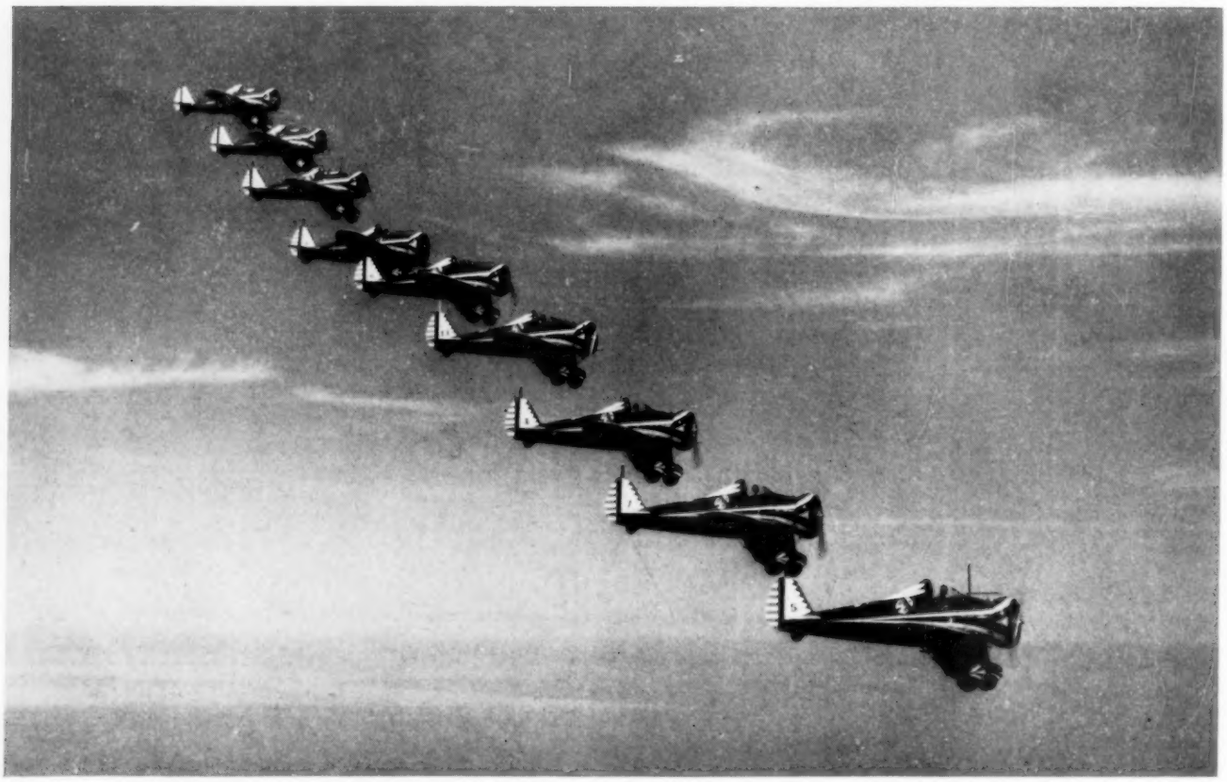
The views expressed in this article are personal to the author and in no way reflect the opinions of the Navy Department.



Official Photograph, U. S. Army Air Corps.

AN ELEMENT OF NATIONAL STRATEGY—AIR POWER

The course of the World War shows that first-class fighting nations will bear enormous burdens before they will confess defeat. Part of this willingness to bear great burdens is due to national pride, but a larger part is due to common sense, because human experience demonstrates that it is "woe to the vanquished". And as every European nation has in turn been defeated they know from their own bitter experience the truth of the old Roman adage. Any boy who grew up in the South after the Civil War can testify to the same truth. Only in America of 1936 can the astonishing statement be made and believed that the victors in war are as badly off as the losers.

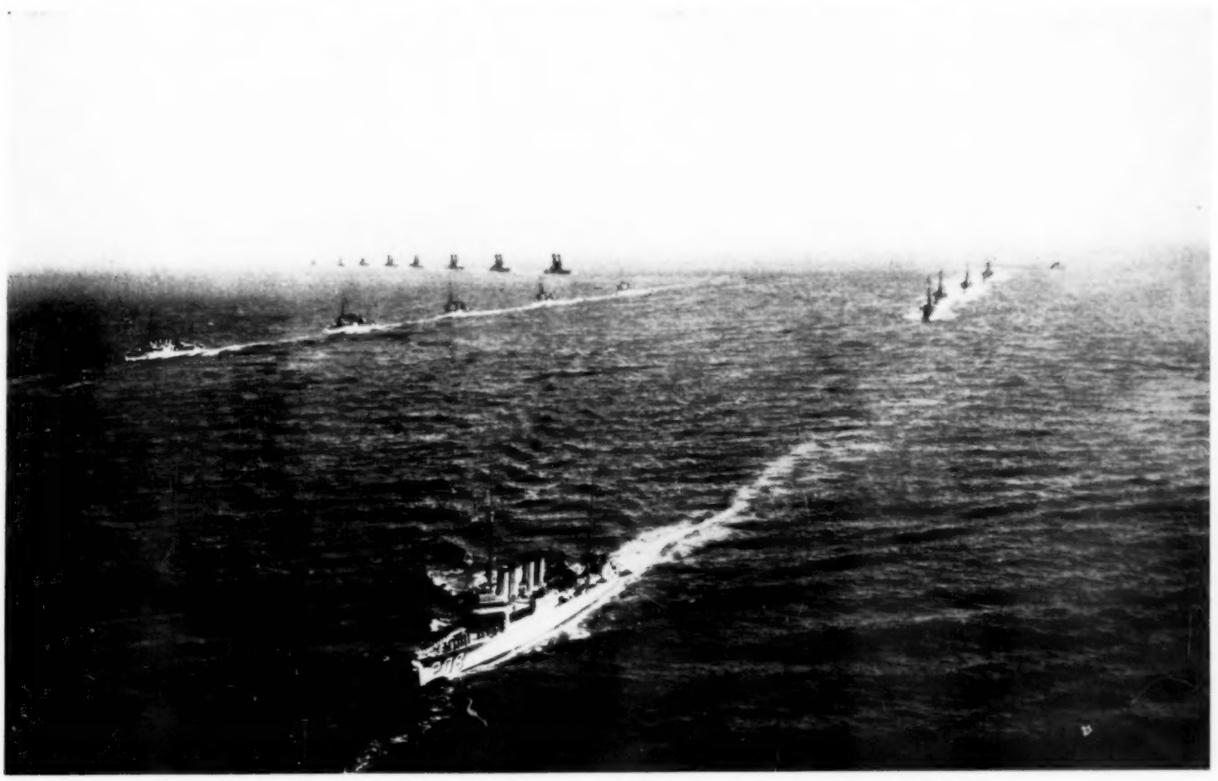
THE war can be divided conveniently into calendar years. The reason is that during the winter months fighting could not be carried out to advantage either on the Western or Eastern fronts. A contributory reason was that the losses were so great on both sides that lulls in the fighting were necessary in order that replacements might be made and burnt-out divisions restored. By the end of 1914 the three armies on the Western front, British, French, and German, were all exhausted. The commanders on both sides realized that the war could not be decided quickly.

On the Eastern front, the Germans had been successful in the northern sector and had driven the Russians out of Prussia but had been able to make little advance into Poland. Further south, the Russians had been very successful in their attacks on Austria, materially helped by the division of Austrian troops which attacked Serbia. Von Falkenhayn, who had succeeded Von Moltke, was convinced that it was necessary to maintain the eastern frontiers of Germany intact and prevent the invasion of Austria-Hungary by the Russians, but both of these conditions were subordinate to the essential one that the German position in France must be kept unbreakable.

On the Allied side, Joffre believed it was essential to renew the Franco-British offensive before the Germans could consolidate their position in France. With this in mind Joffre attacked in December, 1914, and early January, 1915, and while these attacks failed to gain ground, they held the bulk of the German troops in France and relieved the pressure on the Russians from Von Hindenburg's armies. This was not only good for the French, but it proved to the Russians that the French were willing to do their share of the fighting in an effort to relieve the German pressure on Russia. The French Army in 1914, assisted by the British Expeditionary Force, bore the brunt of the German attack; thus, nine out of ten German soldiers were hurled against Joffre during the first five months of the war. Even when Von Hindenburg took the offensive against Russia in December, eight out of ten German soldiers were still engaged in France.

At sea the Allied navies were in complete control. Their only opposition was the attacks of a few German submarines. This situation continued throughout the war, except that the submarines were increased in numbers and efficiency until they threatened, by their attacks on merchantmen, to starve England.

The strategy of the war during 1915 was almost as simple as that of 1914. Joffre was determined to drive the Germans out of France, and Von Falkenhayn was determined to take the offensive in France as soon as possible in order to destroy the French Army before the English Army was ready. The German reserves were exhausted; four new army corps were due in February, 1915, and Von Falkenhayn refused to



An Element of National Strategy—Naval Protection of Our Sea Lanes

employ these troops until they were properly trained. When they were ready, he proposed to use them on the Western front. However, the Russians continued their attacks on Austria. In spite of Austrian reënforcements from the Serbian front, the Russians were on the point of advancing into Hungary. This dangerous possibility caused Von Falkenhayn to send, in February, three of the four newly raised army corps to Von Hindenburg in an unsuccessful attempt to take the Russian pressure off Austria.

In February, Joffre renewed his attack on the Champagne front, which failed. In March the British attack at Neuve Chappelle similarly failed. These two repulses caused Von Falkenhayn to believe that the German line in France was secure. He therefore determined to improve the situation on the Eastern front.

IN May, Von Falkenhayn reënforced Von Hindenburg with a new army under General von Mackensen. The German plan in the east then began to succeed, and the Germans pushed on into Poland. Joffre then learned that large German forces had been transferred to Russia, and endeavored to take advantage of this situation to resume the offensive in France. He was assisted by the new divisions of the British Army, but these British divisions were only partly trained and, with the exception of one or two divisions, were not ready to attack. Again Foch was in immediate command and almost ruptured the German front, but definitely failed.

In June, Joffre knowing that large German forces had been transferred to the east, planned another offensive. By the middle of July the plan was ready, but the troops were not available until September 25th. Again a heavy Allied attack failed. It included fifty-four French and thirteen English divisions. Von Falkenhayn knew that by reënforcing Von Hindenburg, he had placed an almost unendurable strain on his troops in France, and in September reversed the flow of German troops from the Eastern to the Western front. They arrived barely in time to support the German line in France.

While these struggles were going on in Europe, troops from Great Britain and France were engaged in the Dardanelles Expedition—an undertaking that was ill-advised to say the least. For example, from February to July, Great Britain sent eleven divisions to Gallipoli and only fifteen divisions to France. Had all these forces been sent to France, Joffre would have been able to make his attack on the German line in June instead of September. It is quite possible that had the attack been made in June it would have succeeded. At any rate, when the attack began it resulted in the immediate withdrawal of German divisions from Russia. The ostensible reason for the Gallipoli Campaign was to relieve the German pressure on the Russian front. Therefore, it is plain that if these troops had not gone to Gallipoli, but had been sent to France, the Russians probably would have been relieved in June.

On Christmas Day 1915, Von Falkenhayn submitted his plan for 1916 to the Emperor, who subsequently approved it, and it was the basis of the German strategy of 1916. Von Falkenhayn believed that France "was weakened almost to the limit of her endurance", that "the offensive power of Russia was shattered," and that the Serbian Army had been destroyed. He reckoned that Austria, relieved of the Russian and Serbian threat, could hold her own against Italy. He believed that England was scarcely touched by the war, that she was in no mood for a negotiated peace, and that she was determined to starve Germany into submission.

He thought there was no chance of peace until England's willingness to endure further hardships was weakened. He

thought if he could destroy the French Army in the spring and early summer of 1916, before Kitchener's armies were ready, the English would not have the courage to face the triumphant German Army alone. Therefore, he purposed to destroy the French Army as quickly as possible and chose Verdun as the place for the battle.

Joffre was the actual, but unacknowledged, leader of the Allied armies. His suggestion for 1916, accepted by the Allies, was "to seek to obtain the decision by simultaneous offensives on the Russian, Italian and Franco-British fronts." Thus we see that the strategy on both sides in 1916 was essentially the same as in 1914 and in 1915; the Central Powers were still seeking to strike down one of the Allied Powers at a time, while the Allied Powers were seeking to engage on all fronts simultaneously.

On the sea, Von Falkenhayn proposed unrestricted submarine war, and Admiral von Scheer obtained permission for more offensive operations by the High Seas Fleet. The sinking of the SUSSEX in April and the strong position taken by President Wilson, caused the submarine operations against merchantmen to be abandoned. One-half of the submarines were given to Von Scheer and he attempted various means of using them against the British fleet. One of these attempts brought on the battle of Jutland.

IN accordance with these plans the Germans fought the French Army at Verdun from February through June; in the last week of June, Haig opened his attack on the Somme, and this intervention brought the German effort at Verdun to an end. For the next six months, the British attacked along the Somme and the Germans defended. At the end of the year there was little change in the geographical positions, but the armies of the three nations, France, England, and Germany, were worn down. The battle of Jutland, fought just as Verdun was dying down and the Somme commencing, was indecisive, because Jellicoe would not face the German torpedoes and Von Scheer could not endure the superior gunfire of the British Grand Fleet. *A decisive naval victory by either side would have decided the war in an afternoon.*

The year was marked on the other fronts by an unnecessary Austrian offensive against Italy, which weakened the Austrian army facing Russia and enabled Brusiloff to take the offensive in the East. Nevertheless, Von Falkenhayn was able to stop the Russian offensive and crush Rumania. The Allies wasted an army in Saloniki in 1916, just as they did at Gallipoli in 1915.

At the end of 1916, even the gigantic European armies were being exhausted: Russia was definitely finished, the French were only capable of one more offensive by Nivelle, the German Army was forced to commence its withdrawal to the Hindenburg line, and the Austrian army was only a shell, but still capable of resisting the Italian advance. Turkey had too loyally supported the Central Powers and her armies had been consumed in Southeastern Europe assisting Mackensen to overrun Rumania. Rumania and Serbia were crushed. Bulgaria was fairly well off. It was time for a negotiated peace. Wilson's "peace without victory" was a statesmanlike formula, but the passions of the European people, aroused by their leaders, would not permit it.

Germany's peace proposals in December 1916, were rejected and so was President Wilson's offer of mediation. In January 1917, Germany decided upon unrestricted submarine warfare. With her submarines, Germany expected to crush England before the United States could get ready. When that expectancy failed, she undertook one last desperate offensive in 1918 in a final effort to win the war on the land. In this offensive she was aided by the fact that in 1917 Russia had entirely collapsed. Unfortunately for Germany, by the spring of 1918 we were delivering troops in France in large numbers. During the summer we delivered 300,000 per month and by August 1918, the German Army was broken.

In broad outline the foregoing are the leading strategical events of the war.

ONE of the most surprising features of the World War was the enormous consumption of munitions. This fact caused all of the countries at war to turn their industries into a vast munitions factory. Germany was the first nation to realize the need for more munitions. As early as October, 1914, she was rearranging her domestic economy and industry, and while she made some mistakes, on the whole she adapted her industry to war better than any other country.

We hear much about the advantages Germany gained by her superior preparation before the war. Actually, at the end of 1914 she had consumed all of these advantages, and yet at the end of 1915 she was better off than she was the year before. One reason for this improvement was the more rapid and skillful adaptation she made of her industry to war. The quick realization by the German High Command of this necessity for more munitions, her more efficient methods of manufacture, her superior skill in organizing, and the devoted way in which her workmen accepted their tasks, enabled Germany to mobilize her industry more rapidly than any other nation. In fact, she also supported her nonindustrial allies.

England and France were slower than Germany to realize the necessity for greater production of munitions. When they did realize it, they were still handicapped by various laws and trade-union rules that prevented rapid and efficient production. Russia found industrial mobilization an impossibility; she could not maintain her peace-time transportation system.

The following are salient facts in the relationships of industry to strategy in a future war.

We can no longer fight wars with our bare fists. The bravest army and navy in the world will be soonest destroyed unless supplied with adequate and modern munitions. All forms of munitions become obsolete rapidly, and therefore we cannot depend upon a huge reserve stock laid down in peace time, even if we were willing to tie up the millions of dollars necessary for such a reserve. Therefore, a sound munitions and ship-building industry is as essential to a modern state as is its army and navy.

Skilled artisans cannot be improvised. For example, the mechanical technique required to turn out a 3-inch shell with an efficient fuze, requires the most skillful machinists. In a modern war, our nation would be helpless without an army of highly skilled laborers. Furthermore, these men must be kept in the shops throughout the war.

A striking example of the value of an industry was shipbuilding during the World War. Despite serious mismanagement at the start, our shipbuilding industry began to function in time, and its potential capacity to deliver replacements had as much to do with breaking down German morale and

AN ELEMENT OF NATIONAL STRATEGY—MUNITIONS POWER FOR OUR MILITARY AND NAVAL NEEDS

winning the war as the protective measures of our destroyers. The German Government and people realized, at last, that if the war progressed another year we could actually launch merchant ships faster than their submarines could sink them.

The ideal condition would be to have a skeletonized munitions industry ready to expand at a moment's notice in time of war. A great deal can be done along this line, and a great deal is being done along this line through the office of the Assistant Secretary of War which maintains a liaison with American industries in order to meet this very difficult war-time situation.

WE all know there is a very efficient form of discipline in every factory that is properly managed. There could be no management without control, and control is discipline. This form of industrial discipline is quite different from the discipline aboard men-of-war or in army regiments, but it is necessary, and the workmen as well as the management realize it is necessary.

Some of the best disciplined organizations I have ever seen have been in industry. The sense of order and skilled control is obvious the moment a well-managed plant is entered. This industrial discipline in most instances will be sufficient for the internal control of plants in time of war. The higher control and coördination of all plants will be accomplished through a War Industries Board.

Industry's war problem will be *to effect a combination of Government supervision and industrial independence* that will permit American industry to operate as nearly as possible according to its usual American peace-time methods, and at the same time not only to be adapted to the needs of war-making agencies, the Army and Navy, but to have its capacity increased.

Fortunately, American industry is a flexible organization and industrial management in this country is not frightened by largeness or intimidated by difficulties. Practically every major industry is represented by a national association though which each factory or plant can be reached. It is quite easy to assemble, by telephone, leaders of industrial associations from all parts of the country; to gather them around one table and to emerge, in two or three hours, with a good plan of action—always provided that there is the impetus of patriotism.

All that I shall now say about the control of industry during war is based on what I learned from listening to lectures by Mr. Bernard Baruch, Chairman of the War Industries Board during the World War. For three years in succession I had the pleasure of hearing him explain how the United States controlled her industries during the great conflict, and I believe that we can do no better than to follow the same general system during a future war. The authority for such a board is derived from the war-making powers of Congress. A war industries board is essentially a vast holding company for American industry, with a view to developing all of its energies for war purposes. It will be seen that no such control would be possible unless it was supported by practically unanimous public opinion. However, it has been the experience of our country that we are slow to go to war,

and will not go unless the country is practically unanimous.

There are three things to be done to control industry without regimentation: 1. Organization of control. 2. Organization of demand, in order that the country's needs may be known. 3. Organization of supply to meet these needs. I will only discuss the organization of control. In time of peace, business concerns are subject to the laws of supply and demand, and if a manufacturer violates the law by producing more than he can sell, he usually goes bankrupt. In time of war a shortage is created, competitive bidding usually starts, and the manufacturer has no difficulty at all in selling everything he can produce. The trouble is to obtain the raw materials and labor with which to produce the goods. That is the essence of the problem.

A war industries board is the Government agency that can control both labor and material. The chairman of the board has the undivided responsibility for all decisions. Members of the board simply advise the chairman. Committees are better for counsel, but an executive, a single responsible head, is absolutely necessary for prompt decisions. The board exercises control by the following measures: the authority to commandeer, the establishment of priority, and the power to fix prices.

THE right of commandeering property in time of war has never been questioned. It has often been exercised and there is no repugnance to it in the American idea of liberty. The essential procedure of commandeering is simple—a committee fixes the price for the property. Next to the right of commandeering, the board has the right to determine the priority of delivery of raw materials to factories. The latent power in this will keep all manufacturers in line. The patriotic ones will accept its decisions without demure and the unpatriotic ones would be deprived of their coal or other essential raw materials.

A draft board can control man power by the "work or fight" order. This will not draft men for a particular job; it will say, "No matter what the grounds for your deferment from conscription, unless you are faithfully, continuously, and usefully employed upon an enterprise essential to the prosecution of the war, you will immediately report for service with the colors". The Government will not tell a particular man to work for Mr. A or Mr. B, or to work here or there. It will say that a man must find work in one of the essential industries or be denied rations, transportion, fuel, and supplies.

It is plain that only the support of public opinion could enforce such a requirement, and it further follows that only in a war fully supported by public opinion could these severe measures be applied.

The Government will control the capital available to any industry through a war finance board. This will insure that no capital is allowed to work in an unessential industry. In addition, by a judicious use of an excess-profit tax, the Government can take the profit out of war. Lloyd George had more experience than any other statesman with that problem and asserted quite definitely that he preferred to leave industry under its own management and recover the profits by surtaxes.

On a given day, set by the President, the price structure of maximum prices would be frozen. If prices of certain articles were above normal they would be reduced, if below they would be raised. This would only apply to the maximum prices; any economic influences that would tend to reduce these prices would be allowed to operate freely.

IT IS plain that with all this authority a war industries board could destroy any industry; hence the board must remember that peace follows war, and while it should skeletonize all luxury industries, it should be careful not to actually destroy any industry.

In a future war, there will probably be a shortage of transportation, power, fuel, basic raw materials, and labor. By establishing a priority for them, the control of these four services and of man power can be established, and the board can absolutely control any industry in the United States.

The principle of Government priority should be that all the necessities of the war agencies of the Government, the Army and Navy, must be met first; next, the essentials of industry, and then of the public. Having met the military and naval needs, the priority committee would review the relative needs of the civilian industries, and in this connection it will be necessary to remember the very important fact that the morale of the civilian population is as necessary as the morale of the military forces.

Price-fixing is probably the most difficult of the functions of the board and will undoubtedly cause considerable criticism no matter how fairly done. It can be done, however, through a committee like the Federal Trade Commission. If the whole price schedule is fixed at the outset of the war relative to various elements that enter into the cost of living, we will go a long way toward solving the problem of inflation, not only during the war, but during war's aftermath.

In addition to this, it will be necessary to stimulate domestic production of certain raw materials which we import in time of war. Fortunately, there are very few basic raw materials that we cannot provide in the United States and if the Navy can keep even a few of the sea lanes open, we can depend upon our foreign sources of supply for all strategic materials. There will be many difficulties such as, for example, fixing the price of coal, which some mines can produce much more cheaply than others—but such problems were solved during the World War.

IN conclusion, I do think that Government regulation of industry will be necessary in the event of a future major war. The procedure of mobilizing industry in a future war should follow the methods in the World War. The process may be even easier if we enter the war directly, before inflation of prices has begun. I think what we will need is practically the same organization that was administered so ably by Mr. Baruch during the World War. It will consist essentially, as we have seen, of priority, price-fixing, commodities, and shipping-control divisions, a capital-issues committee and a railroad administration.

A war industries board, through these committees, could absolutely control industry in the United States by leaving the factories, mines, plants, and other industries in the hands of the original managers. This looseness of control was no less effective than if the Government had stepped in and put an Army or Navy officer in direct charge of each enterprise. Moreover it was effective; hence I think we are safe in saying that there is no necessity for regimentation of industry in any future war which may be thrust upon the United States.

The German Army

Military Organization of the Third Reich

By René Laurent*

THE constitution of the German Army was completely changed by the law passed on March 16, 1935, which put an end to the military conditions imposed by the Treaty of Versailles. Under the terms of that treaty the Reichswehr (so named by Colonel Reinhardt, the last Prussian Minister for War) was not to number more than 4000 officers and 96,000 men, to be engaged by voluntary recruitment for a term of twelve years' service with the colors. Heavy artillery, tanks and aviation were forbidden. This law reëstablished conscription and fixed the peace strength of the military forces at twelve army corps and thirty-six divisions, making a round total of 550,000 men. And it was further enacted that the army should be equipped with all the arms in use elsewhere.

Military service is now obligatory for all German subjects between the ages of 20 and 45, after which mobilization may still be required in time of war, or under exceptional circumstances by special decree of the Minister for War. The law further lays it down as a principle that every German, man or woman, must put his or her services at the disposition of the state in time of war; that is to say, must hold themselves liable to mobilization though not necessarily for military service. Up to the age of 35, all men who have served with the colors belong to the Reserve and if they have not so served, to the Special Reserve (*Ersatzreserve*); from 35 to 45, to the territorial army (*Landwehr*); and if called up in exceptional circumstances after the age of 45, to the *Landsturm*.

The term of service with the colors begins at the age of 20; that is to say, a year earlier than in France; and before entering the army proper every man is obliged to serve as a laborer for a period of time which is at present fixed at six months. There is no legal term of military service; it depends upon the decision of the Führer, which he can change at any time. At present, however, it is fixed at one year.

But this year's military service is by no means the sole method of recruitment for the German Army. There are a whole series of supplementary regulations designed to effect the transition from voluntary to obligatory service, to keep the ranks up to strength during the years when there will be fewer available recruits, owing to the low birth rate during the war, and to incorporate the old Reichswehr and State Police in the new army, in order to provide a nucleus of veterans. The old, long-service army does not only form a basis for the organization of the new, but privates and non-commissioned officers who joined it before July 1, 1933, can now prolong their term of service and form a very valuable stiffening to the conscript ranks. The State Police (*Landspolitzei*), including the Green Police (General Goering's force), will henceforth be considered as part of the reserves of the army, with the exception of the detachments stationed in the former demilitarized zone, and they will be attached to the different units.

In 1935, two classes, those born in 1914-1915, came up before the military council; only the first joined the colors while the second was enrolled in the labor corps. In East Prussia, on the ground that this province (which is separated from the rest of the German Reich) does not provide a sufficient force because of its small population, the class of men born in 1910 also has been called to the colors. The classes of 1911 to 1913 will follow them successively during the next two years, so that two classes will be mobilized simultaneously.

Throughout the Reich, men of the classes of 1910 to 1913 are accepted as volunteers, and there is an active propaganda to persuade them to enlist—especially those capable of becoming officers, such as university students. Reservists between the ages of 25 and 35, who no longer can be expected to undertake a long term of active service, are attached to special units—the E troops (*Ersatz Bataillone Ergaenzungs*)—wherein they serve for eight weeks to learn the rudiments of soldiering, thus shortening the necessary period of training in time of war. Up to now the Ersatz Reserve has been filled exclusively by volunteers—recruitment having been sufficient to obviate the necessity for legal compulsion. In the future it will include also the men of the younger classes who have not done their active service, either because the number of recruits available for their year has been greater than the contingent required, or because they do not come up to the necessary physical standard. They will be registered to serve in time of war in the auxiliary corps. It is considered essential that these various categories should receive a certain minimum of instruction in peace time. The law of March, 1935, gives the Minister of War power to call upon reservists, either Ersatz Reserve or Landwehr, to follow instructional and training courses, the number and length of which are not specified but depend solely upon his decision.

It is interesting to note that German subjects of dual nationality are obliged to fulfill their military obligations in Germany even if they have already served in a foreign army; that foreigners can enlist in the German Army (this regulation being made especially with a view to including men of German-speaking nationality—Austrians, Czechoslovaks, etc.); and finally that "non-Aryans" are not required to serve in the army proper in time of peace, being relegated to the Ersatz Reserve. A recent decree has laid it down that men having not more than two Jewish grandparents may be admitted to serve upon their own request—which must however be submitted to a special commission.

THE German Army, being composed of thirty-six divisions and twelve army corps, as already noted, is divided into three groups with headquarters at Berlin, Cassel, and Dresden. This division of the army corresponds to the territorial organization of the country, which consists of ten military

*From the series of articles entitled "Armées Etrangeres" and published here by permission of the Editor of *Le Temps*, Paris. English translation by Miss Jane Soames.

Since the writing of this article the German Army has reoccupied the demilitarized zone in the Rhineland and increased the period of conscript service. It is probable, therefore, that all figures quoted are now below actual strength.

zones: Koenigsburg, Stettin, Berlin, Dresden, Stuttgart, Münster, Munich, Breslau, Cassel, and Hamburg. There are at the time of this writing, only ten army corps with the colors, and it is possible that the two others will be stationed in the demilitarized zone, or that they will be made up of special bodies of troops—motorized units for example.

The generals in command of the three military groups are under the orders of the Commander in Chief (at present General von Fritsch) who in turn, with the Commander in Chief of the Navy (Admiral Raeder) and the Commander in Chief of the Air Force (General Goering), are subordinate to the Minister for War (Field Marshal von Blomberg). The functions of the latter are peculiar: contrary to the usual custom (and indeed to German military tradition) he is not only head of the Ministry—that is to say, the organization of the army—but is also the supreme commander in chief of all the forces, including the navy and air force. His full title is "Reich Minister for War, Commander in Chief of the Armed Forces" (*Oberbefelshaber der Wehrmacht*); and above him there is only the Führer, who is called simply Commander in Chief (*Oberster Befelshaber*).

All essential administrative decisions are therefore taken by the Minister himself, in consultation with his own large staff, which is directly responsible for the whole system of economic mobilization. This considerable body is made up of various services, including the *Wehrmachts-Amt*—a complex organization of which General von Reichenau, an intimate of the Führer and one of the most influential personalities in the new army was the head. Further, the General Headquarters Staff which was abolished by the terms of the Treaty of Versailles, has been officially reconstituted since the 1st of July, 1935, under the designation of *Generalstab des Heeres,* and is now commanded by General Beck, a brilliant officer who is one of the leaders of the military reorganization of the Reich.

It has been suggested that the unusual powers with which, under this new régime, the Minister for War is endowed, even in time of peace, is due in large measure to the personal influence of General von Blomberg; and that his patience, tenacity, and willingness to yield on certain purely formal matters (such as the adoption by the whole army of the National Socialist emblems) have resulted in his obtaining quite exceptional authority. That he has been able to formulate regulations by virtue of which the present Air Minister, General Goering, is subordinated to himself, is an indisputable proof that his influence with the Führer is very great. It is hardly necessary to add that in time of war, by virtue of the system of civil mobilization (which includes the whole population of the country and all means of production), he must become an absolute and unfettered ruler—a position which Hindenberg and Ludendorff, in spite of their prestige, never attained. It is indeed well known that they both frequently complained of their limited powers. The question whether this unchecked authority may not encroach upon the functions of the head of the state is unavoidable: for such powers, in the hands of a resolute and ambitious soldier, especially if he should be victorious in war, would seem likely to constitute a grave danger of military dictatorship.

It is difficult to give any precise indications of the material at the disposition of the German Army while it is still in process of reorganization. First of all, because that which has been decided upon is not yet entirely ready, and secondly, because there is no certainty that final decisions have yet been taken as to the various categories of arms and their respective importance. It would appear certain that the question of heavy arms (artillery of more than 210-mm. caliber and tanks of more than fifteen tons) is not yet settled. It will be remembered that the Führer, speaking on May 21, 1935, suggested their abolition; and it is probably fair to suppose that this suggestion was made with a view to negotiation—the question being still under discussion.

As to all other categories of arms, it is understood that the German Army will be guided solely by the same considerations paramount elsewhere; that is to say, it will be equipped in the proportion judged to be necessary by its numbers and the offensive and defensive measures which those forces may be called upon to undertake. The German Army has one machine-gun company per battalion; one company of trench mortars and one antitank company per regiment. The existence of tanks was first officially made public during maneuvers carried out in Bavaria in July, 1935, at which the Führer was present; a series of photographs of these operations was published a few days later in the *Volkische Beobachter*—apparently of light tanks of from six to eight tons. The German Army will certainly be equipped with smaller tanks also.

The greatest possible importance is attached to the question of communications—amongst them radio telegraphy—and motorization. The present High Command would seem to aim at a progressive elimination of horse cavalry in favor of motorized troops, such as regiments of motorcyclists, each vehicle with a side-car to carry three men, and armed with a light machine gun. Certain elements of infantry transport are motorized while all the transport of motorized units is completely motorized. It is believed that all the transport of the army and corps troops will be motorized.

The essential condition of motorization is that both men and vehicles shall be able to maneuver over the country as well as on the roads. This aspect of the problem is being most carefully studied. What is called *Gelandesport* (motoring over rough ground) is indeed more popular in Germany than anywhere else, being inspired and encouraged by the automobile section of the National Socialist Party, which can count 500,000 members and operates in close collaboration with the army. Its head, Major Huhnlein, has laid down three obligatory trials for all local sections: winter trials, direction finding by night, and trials over rough ground. Furthermore, similar trials are organized for the whole country on the lines of those held in the spring of 1935 in East Prussia, over sandy and broken country. These meetings, at which there were 18,000 entrants last year (as against 3000 the previous year) are a witness to the enthusiasm of motorists; while motor-bicyclists have already performed what may be called acrobatic feats.

The official program would not appear to aim at an excessive provision of motor transport in time of peace; it will be kept down to the essential minimum and supplemented in time of war by requisition of civil vehicles. Training exercises are already being carried out with the coöperation of civilian cars and their drivers. The motor industry has been ordered to undertake researches in order to produce a type of vehicle capable of traveling over rough ground, and it is surely fair to consider that military considerations have been

MECHANIZED UNITS OF THE NEW GERMAN ARMY *International*

Chancellor Hitler, on the reviewing platform, is accompanied by Field Marshal von Blomberg, Minister for War and Commander in Chief of the Armed Forces; General Goering, Minister for Air and Commander of the Air Forces; and Admiral Raeder, Commander of the Navy.

paramount in the manufacture of the giant autobuses which were exhibited at the last Berlin motor show. The tremendous speed which these huge cars can attain—up to 90 miles an hour—will make it possible to transport large bodies of troops by *autostrada* much quicker than by rail. The autostrada—specially constructed motor roads which will cover the whole country with a network of approximately 4375 miles (7000 kilometers)—are also a very important military creation; otherwise they would hardly be justified in a country like Germany which possesses relatively few motors, the majority of which are of low horsepower, incapable of maintaining speeds which would make the construction of model roads necessary.

The very great importance given to all questions of transport is in part explained by the geographical position of Germany which obliges her to envisage a war on several land frontiers simultaneously, and consequently, as was the case during the last war, the necessity of moving her troops rapidly from one to another. The extent of the German land frontiers makes it impossible for all sections to be strongly fortified, but none the less it is well known that fortification works have been begun some time ago in East Prussia. They are now in course of construction also on the line of the Oder on the Polish frontier and on the Czechoslovak frontier as well. On the west, fortified posts already exist on the right bank of the Rhine—even (it would appear) in the demilitarized zone.

GERMANY simultaneously threw over the clauses of the Versailles Treaty which forbade conscription and the formation of a military air force, and, and at the very moment when the decision to consider herself free from these limiting clauses was officially made public, also announced that the air fleet was not simply a future possibility, but had already attained respectable proportions.

Varied figures have been published as to its size, and it would appear to be futile to attempt to arrive at anything like exactitude since there is nothing but presumption to go upon, and in any case the total of machines certainly increases every month—if not every week. It is worth while to remark, simply as a guide, that General Goering, the Minister for Air, allowed it to be understood in May, 1935, that the German Air Force could not count more than a thousand machines—which is not to say that by August this figure had not been considerably increased. All one can do is to bear in mind that according to General Goering all the German machines are of recent date and that if the proposed "Air Locarno" is ever realized, Germany will claim parity with Great Britain and France. If no such arrangement is established, it may be taken as certain that parity will be the minimum force at which the Reich will aim.

The German air fleet is made up of squadrons (*Geschwader*) corresponding to the infantry unit of a regiment, each composed of three groups, the groups including three flying squadrons of nine machines each, and one can count it as certain that each squadron possesses a reserve of three machines. The territory of the Reich is divided into six aërial districts, of which the respective centers are Koenigsburg, Berlin, Dresden, Münster, Munich, and Kiel. The latter is for coast defense, and the force stationed there consists solely of seaplanes. Each region is under the orders of a general commanding all services, and a colonel commanding the air forces. The latter include also the units for insuring communications, which follow the squadrons and are responsible for telephone, land radio posts, etc.; and also the antiaircraft artillery, which in Germany forms part of the air force.

Every effort is made to develop public interest in aviation: the Hitler youth organizations have flying sections where model airplane construction is taught, and this is encouraged even in the primary schools—the teachers being sent to undergo aviation courses so that they can instruct their pupils.

Antiaircraft defense has been defined rigorously by a

recent law which enjoins every person resident in Germany, foreigners as well as German subjects, to carry out all orders which the authorities may pronounce, and render every service required of them without the right to claim any indemnity.

THERE is a great contrast between the methods of recruitment of the cadres in Germany and France. The French system of the *grands écoles,* the entrance to which is by open competitive examination, is unknown in Germany. Under the Empire the cadet schools were exclusive and admitted only the sons of aristocrats and officers, thus maintaining in the higher ranks of the army a class tradition which might almost be called a caste. This system was in principle retained by the Reichswehr, though the cadet schools disappeared under the Republic. But the military leaders refused to give up a method of selection which made it possible to insure that candidates not only possessed the necessary intellectual qualifications, but also a certain type of character and family connections. No one could receive a commission without the consent of the commander of his corps, and there was always strict inquiry as to family and above all, to political opinions which were required to be irreproachable from the nationalist point of view. The last consideration, however, made it possible for young men of modest origin to take up the military career; moral and physical qualities were held to be of greater importance than intellectual. This double point of view continues to govern the choice of officers in the new army, since National Socialism, avowedly hostile to any caste system, requires that the military cadres be loyal to the party, and puts character and physical training above intellectual qualifications.

The army has adopted a certain number of tests, similar to those employed in America to determine individual aptitude for this or that profession. There is a series of psychological examinations in the course of which a film is made of the candidate so that his expression can be studied, an electric current applied to determine his powers of resistance, a series of objects of varied geometrical form passed before him to test his powers of observation and memory, while his optical reflexes are measured by a specially designed instrument. His handwriting is examined, he has to go through a series of military exercises, and a number of other tests are applied to establish his powers of command, knowledge of the German language, and elocution. That fifty per cent of the candidates pass this examination is sufficient proof that either the standard is relatively low, or the material of exceptional quality.

The period of military and technical training is, on the contrary, long. The future officer, usually already possessing a diploma of higher education, is given the title of *Fehnenjunker* (candidate) only after six months' training. He then serves nine months more, after which he spends ten months at a military school (*Kriegsschule*) and becomes a second lieutenant, returning to serve two years with his corps before being promoted to lieutenant.

In principle, every citizen who has done his year's military service can become an officer of reserve—no examination is required. But there are various qualifications held to be essential; notably, powers of command, and opinions and morality above reproach. It is also expected that the candidate shall possess sufficient means to support his family, and there must be definite proof of not only his own "Aryan" nationality but also that of his wife. During the next few years, young men between the ages of 25 and 35 who have not even done their military service but who fulfill these and similar conditions (notably the student class), can be admitted as officers of reserve after undergoing the necessary period of training, as also can officers of the old army, either active or on the reserve list, and the noncommissioned officers and officers of the Reichswehr. This class provides ready-trained cadres which are essential to the formation of a reserve for the new army.

IT is well known that the policy of the National Socialist State is militant and that military training takes an important place in its program. This was indeed evident long before the Germany Army was reconstituted by the law of March, 1935, and it is hardly an exaggeration to say that all German education is one vast scheme of military training. The tendency has already been illustrated by the details given as to those societies, nominally civil, such as the motor sections of the National Socialist Party (commonly referred to by the initials N.S.K.K.) and the flying clubs. Nearly every one has seen the Hitler youth societies drilling and firing on the ranges; nor can there be any doubt that the encouragement given to this sort of exercise, and to marching, rather than to games, is sufficient indication of the real object of the leaders of German youth. The whole organization of the Hitler-Jugend—the uniforms, commands, and discipline to which boys become accustomed from their earliest years—are a proof of its military character.

The Nazi shock troops have been considered in the past (at all events by certain sections of foreign opinion) as something of an auxiliary army, but this view was never shared by the high command, which is accustomed to speak with some contempt of this kind of playing at soldiers. By the decree of June 30, 1934, the importance of these bodies was greatly minimized; they still exist, of course, and constitute a half-trained reserve which could be mobilized quickly, but they cannot be considered as fully competent troops ready to take the field equipped with modern armament. Their rôle has always been that of National Socialist militia, and this function has now been taken over by the S.S. (*Schutz-Staffein,* which closely approaches in character the Italian Fascist militia) and the labor corps.

These latter bodies, organized on a volunteer basis by Colonel Hieri before the National Socialist Party came into power, rapidly assumed great importance, and last year, at the Nuremberg Congress, were put forward as one of the most cherished creations of the new régime. It is indeed obvious that the labor corps provide not only an occupation for the unemployed but also make it possible to train the young men thus enrolled in a much more thorough and efficient fashion than the shock troops—most of whom continued their various professions and lived at home. The labor corps are housed in camps away from the towns, all classes are thrown together, and the hard work undertaken (such as irrigation, land clearance, road making, etc.) alternating with semimilitary drill, insistent National Socialist propaganda, and strict discipline, make these camps (as it is believed) the best schools for the preparation of obedient citizens.

It has been decreed that now, before joining the colors, every young German must serve six months with one of these labor corps, which have become an essential part of the army

and indissolubly linked with it. They provide an excellent school of physical training and discipline so that the conscript, when he joins his regiment, is a half-made soldier, having already learned to drill and having had a certain amount of firing practice with small arms.

THOUGH it may be maintained that the Germans are not a warlike race, none will deny that they have the greatest possible admiration for the military virtues. Their natural tendency has, in this respect, been formed and fixed by a century of education; and such respect for discipline, such ready submission to orders from above, such a taste for uniform and marching in rank cannot fail to favor the prestige of the army and its efficiency. Nor must the ardent patriotism of the German race be underestimated—intensified as it has been by the defeat of 1919 and the conditions imposed by the Allies. The enormous majority of Germans have always felt those conditions—especially as regards the army—to be infamous, and protest against them was always the trump card of the opposition, while the prestige of the Republic certainly suffered from having tolerated them so long.

Hitler's most popular act indisputably has been his repudiation of Section V of the Treaty of Versailles, and on the day that repudiation was proclaimed he probably counted very few enemies in Germany. Even those in opposition to the régime he has imposed were delighted that he should have regained for the Reich the power to form an army. Indeed, if it be admitted (as the National Socialist Party has always claimed) that its origin and spirit were military from the beginning, that was the Führer's predestined task. The front was the birthplace of his doctrine, which has always insisted upon the virtues of courage, comradeship, and devotion to the common good; his staff and the best of his troops were all ex-soldiers. The organization of the Third Reich is above all military, and the principle on which it is founded—the Leader—is essentially that of a Commander in Chief. One might even go so far as to say that under National Socialism there are no civilians—everybody, whether in or out of uniform, obeys the word of command.

Such a system cannot fail to produce a very close collaboration between the rulers of the country and the army and a diffusion of the military spirit among the masses. It has been suggested more than once by foreign observers that there is conflict between the High Command and the political leaders; but such opposition, if indeed it exists, can affect only certain special personalities and institutions, certainly not the régime itself nor its supreme representative—Hitler. The army cannot fail to be conscious that it is National Socialism which has given back to it that rank and importance which it formerly enjoyed, and also the means to make Germany once again a great military power. Hitler has always proudly proclaimed that he is himself first of all a soldier, and his book, "Mein Kampf," contains phrases such as the following: "The army is the most important school for the German nation, and what the German people owe to it may be summed up in one word—everything." Further, the present head of the army, General von Blomberg, loses no opportunity of publicly emphasizing the debt which the army owes to the Führer; in his proclamations he continually reminds the troops that they have sworn fidelity to the national leader.

No one can doubt the sincerity of these words, nor the closeness of the bonds which today unite the new army and the National Socialist Party. But it may be permitted to question whether—at least in the future—some modification will not take place. It is important in this connection to remember the rôle played by the military leaders since 1933 (or even since 1919). If it be true (as is stated by Major Foertsch in his book, "Die Wehrmacht im National-Sozialistischen Staat") that the Reichswehr could in fifteen years form a state within a state, and if General von Blomberg could, in two years, raise the army to a position of such material and physical importance, the official formula that "the two pillars of the state are the army and the party, the first bearing arms and the second expressing the popular will" would seem to be subject to certain reserves. May it not be that the separation between the two bodies is perhaps not so clear-cut as is claimed? And is it not possible that those who bear arms—that is to say, the effective power—may not some day be tempted to encroach upon the domain of politics also? The future alone can decide.

TODAY, those who represent the opinion of the new army, including Major Foertsch, emphasize that the soldier must have a political alignment wholly in the National Socialist sense. The army can no longer pretend to be above all parties, as was the case when there were several parties, each holding a different opinion: it must be one with that single party which incorporates the state. According to the above analyst, "there never has been a wholly unpolitical army, and there never will be one, because the army—the state's means of defending its frontiers—is and must be a powerful political factor also. This does not mean that the individual soldier can intervene in the political field; but he does study political problems, and is bound to maintain an attitude in strict conformity with National Socialist theory."

It is plain that this is the expression of an aim rather than the definition of a reality, for now that conscription has been reëstablished, who can guarantee that every German soldier is wholly in sympathy with National Socialism, in spite of every effort to eliminate suspects?

All that can be affirmed certainly is that National Socialism aims at complete unity for the defense of the country; and while it has helped to reëstablish the Prussian military tradition, it has added also certain new elements which the new army at least affects to accept without reserve, particularly the rejection of the caste system, now replaced by a spirit of comradeship, while merit supersedes birth and social position. The army even subscribes to the Socialist doctrines which form part of the program of the new régime. According to Major Foertsch, "the National Socialist movement, by placing the race and the people at the foundation of every political act, establishing the principle that the general good is more important than the particular interests of individuals, by respecting deeds and character more than learning, and by its acceptation of the concept of leadership and political responsibility as basic political principles, has profoundly modified the character of the soldier. This effect will endure long after anyone of this generation bears arms, and it is good that it should be so. The soldier's highest task is to preserve all the best of the past, but also to seize the significance of the present, and daily build up new values."

If this is the morale of the new German Army, and if its action be so inspired, the popular support it will receive and its links with the governmental régime will be very strong.

Military Motor Transport

The Development and Coördination of Motor-Truck Fleets, II

By Col. Brainerd Taylor*

A FURTHER study of the processes of vehicle production versus component units and parts production, the later of which involves manufacturing, may serve to clarify Quartermaster Corps planning and to indicate the availability to the Government of motor transport fleets, both military and otherwise, that are planned to meet the requirements of all phases and cycles of transport experience. In this analysis the reader must not lose sight of the fact that no manufacturing is involved in vehicle production—the first category. Manufacturing is conducted only in the second, third, and fourth categories; namely, Major component units manufacture; Minor, subunit, parts and accessory manufacture; and Semifinished-product manufacture and fabrication.

Fig. 1 (see page 151) represents a conventionalized, diagrammatic study of the process of assembling motor vehicles in the first category. In principle, it is illustrative of every vehicle assembly process in the industry, regardless of whether the process is called "assembling" or "manufacturing," and regardless of whether the vehicle is built up in one spot, with component units and parts being brought to it by hand, or whether the chassis frame moves down a traveling track, to be met at given points by component units and parts, which also come in on traveling devices or are stacked opposite the point along the main assembly line where they are attached to the moving frame. Starting with the bare chassis frame at the top, or north, and ending with the completely assembled vehicle at the bottom, or south, the main vehicle assembly line is indicated.

Coming in from east and west, diagrammatically, are the feeder lines. Some are overhead trolleys or endless belts carrying engines, bodies, wheels, fenders, and some are mere stacks of the same or other units and parts. In the assembly set-up of any typical vehicle assembly plant, the rate and volume of flow on east and west feeding lines, and the number of different models or sizes that constitute the flow of any given unit or part, depend upon the number of different vehicle models and the relative volume in which each vehicle model is being produced.

The flexibility with which vehicle assembly plans can be changed to meet the demands of the motor-vehicle market is obvious in the diagrammatic illustration shown in Fig. 1. Whether assembly plans are changed to produce new vehicle models upon which the producing company intends to compete with other companies to meet the dictates of fickle fashion (which demand new paints, colors, streamlines, and novel gadgets—mere sales promotion), or to introduce new mechanical improvements and automotive engineering, or whether the vehicle producer's assembling plan differs from the assembling plan of the purchaser, matters little in this category of the automotive industry.

OPPOSED to this flexibility, which the Government and all other large fleet owners are in a position to enjoy without undue increases of vehicle costs, is the inflexibility of major-unit production illustrated in diagrammatic form in Fig. 2 (see page 153). In studying this second category, one is apt to be confused by the fact that products and processes of the third and fourth categories are always present. They also exist separately outside, in plants that do not operate in the second category. Part of the products of the third and fourth categories may flow into a second-category plant by purchase, as do the products of the fifth category (raw-material production), in addition to the third- and fourth-category products manufactured therein.

In every plant of the second category, manufacturing is the principal process, and assembling of the integrated unit is the final process except inspection and test. The unit assembling line, therefore, may be called the "manufacturing line" running from north to south (Fig. 2). In this category, the clear-cut, outstanding assembly line of the first category is not apparent. Indeed, a visitor to one of these second-category plants may see ovens, forges, stamping and many fabricating devices operating along the main north and south line, as well as along the east and west lines.

The production of any shop in the second category is fixed by its tooling set-up and cannot be changed without heavy costs, due to the scrapping of existing patterns and tools and the purchase of new ones. Changes sometimes amount to millions of dollars in a single plant. The inflexibility that exists in this category is most obvious. All Government planning and purchasing agencies should consider the second category with great care. For example, manufacturing processes are coördinated in the industry with the vehicle assembling process so as to produce all the required units and their component parts for a fixed number of vehicles of the various types, makes, and models the industry plans to produce. In addition to parts required to assemble new vehicles, spare units and parts required for the inevitable repair of vehicles in service are manufactured on a percentage basis determined by commercial experience. These additional parts are distributed to dealers, repair shops, and other commercial agencies engaged in automotive repair work. The large fleet owner who plans to maintain and repair his own vehicles may also purchase and stock such parts.

While the manufacturing machinery that produced the component units and parts of any vehicle model is still in existence and operating, the availability of extra spare parts through manufacture exists. The costs of such added manufacture remain the same as in the original manufacture. The moment, however, tools, jigs, dies, and fixtures are changed and new patterns introduced for the production of new vehicle models and new component units, availability ceases to exist, and required parts, if exhausted in the warehouses of fleet owners and dealers, cannot be manufactured except at great cost. Small items costing originally a fraction of a

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cent will thereafter cost ten or a hundred times as much if available at any price.

IN AN assembly program of 400 vehicles per day, in which 200 vehicles may be black, 100 green, and 100 blue, the flow of painted bodies, fenders, wheels, and other parts will be 2:1:1. Similarly, where 4-wheel, 4-wheel-drive vehicles are being produced simultaneously with 4-wheel, 2-wheel drives in a ratio of 1 to 3—recently an actual program of one of the three largest vehicle-producing companies in the industry—the ratio and rate of flow of live front axles and related parts to dead front axles and related parts is 1 to 3. Actually one-third of the daily production of nearly 300 vehicles of various sizes, models and colors, or about 100 vehicles, produced at this plant, were 1½-ton, 4-wheel, 4-wheel-drive, of olive-drab color in strict compliance with U.S. Army specifications, and the rest of the day's production were of various sizes and colors of 4-wheel, 2-wheel-drive types, corresponding to the plant's commercial specifications and orders.

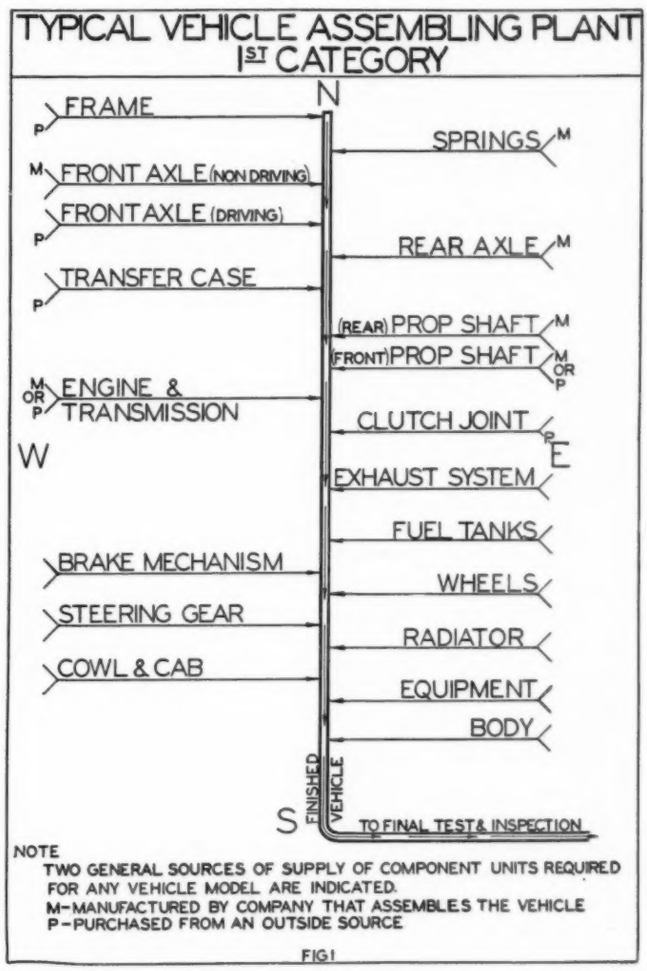

FIG 1

The author of this article inspected the assembling plant referred to herein, typical of all others, in company with its president, engineers, plant and Government inspectors, and was assured that the Army could procure almost any combination of component units and parts it desired, with reasonable coördination of its requirements and the plant's facilities, without interference with its commercial production. The facilities of this plant are ample to permit of the production of all four tractive types considered in Quartermaster planning, or of the two cross-country types alone, at the rate of at least one thousand vehicles per day.

The practicability of procuring vehicles that meet military requirements as to performance ability, quality, sturdiness, and standardization, with interchangeability of component units and parts between vehicles representing different types and models, as contemplated in Quartermaster plans and recommendations, is thus demonstrated.

With expansion of production in this plant to its full capacity, and the introduction of similar assembling programs in the plants of other light- and medium-vehicle producers of the industry, war-time requirements in light to lighter medium-sized models of cross-country types may be assured almost as soon as troops can be mobilized, trained and sent into the theater of military operations.

With respect to the heavier medium- to heavy-duty vehicles of all required types and models, the fact that commerce uses but a very small fraction of the number required to meet mobilization plans means that very little of the required machinery for manufacturing the component units and parts of such vehicles is in existence. There is, however, in existence and in daily commercial use enough of the required machinery to serve as models upon which to base a greatly expanded number of the required tools, jigs, dies, patterns, and other fixtures.

Inasmuch as practically all of the machinery required for manufacturing the heavier units would have to be greatly expanded in time of war to meet military requirements alone, it would appear reasonable for the Government to select as models for such expansion only the tools, jigs, dies, patterns, and fixtures required to manufacture the component units and parts of the heavier types and models of vehicles that are required in military operation. This could be done in selected commercial plants or in the manufacturing plants owned by the Government or in both.

BEFORE concluding this discussion of the automotive industry and Quartermaster Corps plans for its mobilization and coördination in connection with the production of required military types and models of vehicles, a word should be said with relation to Government advertising, specifications, and the awarding of contracts in either peace or war.

Were the War Department to plan for peace-time procurement in accordance with its war-time requirements as to types and models, down to the last detail of weights, heights, lengths, widths, mounting dimensions—even to items of minute finish, and were it to furnish the industry with specifications and drawings, backed by actual models of adopted standard types, (as in the case of many items of military supply, samples of which are to be seen by prospective bidders in Washington or in the Army's depots) there should be no hardship imposed upon prospective bidders or contractors by such detailed planning, provided the Government were to specify component units and parts available in current commercial manufacture.

The industry simply requires ample notice and time to

study the specifications and drawings in detail. In connection therewith examination of an approved sample model is a great help. The industry also requires time to locate and arrange for sources of supply of required component units and parts, to obtain costs and prices therefor, and to estimate vehicle assembling costs and bid prices. Competitive bidders require time to arrange for the manufacture or purchase of required units and parts, for reorganization of their assembly programs, and finally, time to build pilot models and have them inspected with a view to correcting faults or variances from specifications before going into manufacture or purchase of component units and parts for quantity production of vehicles.

METHODS to be used by military planning agencies to bring about coördination of military and commercial demands with automotive resources are difficult to devise. On both military and commercial sides there is encountered the inertia of tremendous organizations composed of many widely separated parts, the natural lack of mutual understanding and interest in times of peace and differences of opinion and of local interests. About all that can be done is indicated by the following activities: 1. Experimental development of military motor transport on the part of the Army in conjunction with exhaustive studies and surveys of the automotive industry. 2. Stimulation of industrial interest by purchases in accordance with such development and military planning whenever funds are made available. 3. Exchange of automotive engineering ideas with regard to the various phases of the motor transport cycle common to military and commercial transportation. 4. Suggestions as to possible markets for military vehicle types and models and component units and parts, designed with a view to increasing their production and use in commerce. 5. Conferences from time to time between executives and engineers of military and commercial motor transport and War Department planning agencies with regard to coördination and the change-over from commercial production to military production upon the outbreak of war.

Whatever planning is done by the Quartermaster Corps must necessarily be in accord with existing law, War Department regulations, and the directives of the Secretary of War. Heretofore this article has been concerned with the physical aspects of the Army's motor transport problem. The Quartermaster General has made his recommendations to the Army, the industry, and the War Department according to his best lights. If his actions and the actions of his Corps have not always appeared to be consistent with his beliefs and recommendations, it is due to interpretations of law, regulations, and directives by which such actions are governed. A brief discussion of these actuating instruments is necessary to an understanding of the planning discussed in this article.

EXISTING law and decisions of the Comptroller General with regard to the purchase of automotive equipment in time of peace, revolve about the following quoted statement of the rule governing purchases of equipment for the Government: "The controlling element is *the job to be done*—the work necessary to be accomplished. The requests for bids should, by specifications or otherwise, fairly reflect the actual need, and the equipment to be had at the lowest price that will serve the purpose is that authorized to be purchased at public expense." The law requires that "specifications should be drawn so as to fairly reflect actual need and not by designation of a particular make or to cover mechanical construction of a particular make." (Decisions of the Comptroller General of the United States, July 1, 1929, to June 30, 1930, p. 521.)

The above-quoted law, affecting peace-time Government purchasing of military equipment, appears to have been enacted with full realization of military requirements on the one hand, and of the capacity of industry as a whole to meet such requirements on the other hand. Applied to motor vehicles, the law recognizes the military need as the basis of specifications and prohibits the selection of any particular commercial make or model of vehicle to meet the need. If, in writing specifications for motor vehicles, military personnel cannot describe the need in terms that can be clearly understood and fully met by the automotive industry, the fault would appear to be with the authors of such specifications rather than with the law or the industry. If military and War Department personnel charged with the preparation and approval of specifications are positive in describing the military needs so far as they can be foreseen in peace time, and equally positive in asserting that approved specifications reflect such needs, there is no authority outside of the military service, under existing law, qualified to set aside such assertions.

IN WRITING specifications for the many different vehicle types and models required by the various arms and services, keeping in view the sixty or more truck makers in the industry, the vast number of different commercial vehicle models to be considered involves an appalling list of component units and parts. Unless the principle of free and competitive bidding required by law and the necessity of obtaining vehicle models that meet military needs, including the need of controlling the spare parts problem, are coördinated in the planning phase, chaotic conditions will inevitably result in later phases of motor transport experience.

As a statement of fact, every new set of vehicle specifications describes a new vehicle model, and the number of different vehicle models, representing various combinations of unit assemblies and parts available in current commercial automotive manufacture, is unlimited.

Only by War Department adoption of basic vehicle type and model specifications that reflect coördinated military requirements without regard to commercial vehicle type and model specifications (but with due regard to the automotive units and parts in current commercial manufacture) can the experience of free and competitive bidding and control of the military problems be assured.

The law does not prevent the drawing of specifications, so that the types and models of vehicles needed to meet the combined military requirements of operation and maintenance, and at the same time to effect economy in the expenditure of public funds, may be designated clearly and in such detail as to be unmistakable to all. No compromise between military requirements on the one hand, and the interests of a few commercial companies on the other, is contemplated or imposed by existing law. Such compromises as have been made in procuring transport that does not fully meet all military requirements appear to be due to policy influenced largely by the necessity for rapid procurement of vehicles in great

TYPICAL COMPONENT UNIT MANUFACTURING PLANT 2ND CATEGORY

ENGINEERING DESIGN TESTING

		OPERATIONS				OPERATIONS				
CATEGORY	MATERIAL	PATTERN SHOP	FOUNDRY	INSPECTION	ASSEMBLY LINE	INSPECTION	MACHINE SHOP	FORGINGS HEAT TREAT	MATERIAL	CATEGORY
4 & 5	CAST IRON ALUMINUM BABBITT	CRANKCASE & BEARINGS			N	CRANKSHAFT			ALLOY STEEL	4 & 5
4 & 5	NICKEL IRON	CYLINDER BLOCK				CAMSHAFT & VALVES			ALLOY STEEL	4 & 5
4 & 5	ALUMINUM	PISTONS & RINGS				CONNECTING RODS & BEARINGS			ALLOY STEEL BRONZE BABBITT	4 & 5
4 & 5	CAST IRON	MANIFOLDS				FRONT END DRIVE GEARS			ALLOY STEEL	4 & 5
4 & 5	CAST IRON	BELL HOUSING				ACCESSORY DRIVES			ALLOY STEEL	4 & 5
4 & 5	CAST IRON	FLYWHEEL & STARTER GEAR				OIL PUMP & OIL PAN			CAST IRON STEEL	4 & 5
PURCHASED ACCESSORIES						PURCHASED ACCESSORIES				
3		CARBURETOR				AIR PUMP				3
3		STARTER & GENERATOR				WIRING & DISTRIBUTOR				3
3		AIR CLEANER				COIL & SPARK PLUGS				3
3		OIL FILTER				LUBRICATING OIL			CRUDE OIL	4 & 5
					RUN IN TEST DYNAMOMETER					
					S	TO CHASSIS ASSEMBLY LINE				

FIG 11

volume, in connection with war-time mobilization, and to an erroneous conception of the ability and capacity of the automotive industry to get quickly into production of required military vehicle types and models.

In the Quartermaster planning discussed in this study, compliance with existing law, as interpreted by the Comptroller General, is fully contemplated without evasion in any respect. As viewed by the Quartermaster Corps, existing law does not conflict with the vital military need of standardization or the more generally recognized need for vehicles that can be relied upon to perform military missions not encountered in commerce. Existing law, in fact, protects the Government in its need for special, or military, vehicle types and models and in its equally important need for standardization, while it also operates to protect the rights of all producers of motor vehicles to compete on equal grounds for Government business, utilizing the current manufactured products of their own industry.

IN APPLYING the laws governing all purchases by the Government in general to the purchase of motor vehicles required to represent military models, a wise policy of the War Department to purchase for military use articles of standard commercial manufacture rather than articles specially manufactured for military use, must also be considered. In specifying required types and models of motor vehicles to be purchased for military use, it has been proven to be quite practicable to specify only component units and parts that are in current commercial manufacture. Thus, an ideal military vehicle model may be specified, which though radically different from any commercial make or model, is composed of engines, axles, transmissions, and other units that are in current commercial manufacture and in common use in many different commercial truck fleets.

Peace-time procurement of vehicles built to meet military requirements serves to acquaint the entire industry with such requirements in detail, and to pave the way for further improvement by, and rapid expansion of, the industry to produce in quantity the vehicles that will be demanded by military needs in the mobilization of the nation to meet the threat of a major war. Such coöperative development of military motor transport in peace time would avoid the necessity of any drastic reorganization of industry that undoubtedly would be forced upon it by the Government in the event of a major war were such coöperative development neglected in time of peace.

The original directive of the Secretary of War that has governed the development of Quartermaster Corps planning is contained in an indorsement from the Adjutant General's office to the Quartermaster General dated March 15, 1930:

1. A. G. 111 (1-29-29) is rescinded and the following substituted therefor:
   a. The following priorities for the development of wheeled motor vehicles for transportation purposes are authorized:
      (1) Priority No. 1—Development of suitable types of light chassis for military purposes.
      (2) Priority No. 2—Development of suitable types of medium chassis for military purposes.
      (3) Priority No. 3—Development of suitable types of heavy chassis for military purposes.

   All of the above types to combine standard road performance with maximum cross-country ability—these chassis to be of commercial types or capable of prompt quantity production.

      (4) Priority No. 4—Development of types of bodies for the several chassis in categories 1, 2, 3 above, designed to meet special requirements of the different arms and services—priority of development subject to the Secretary of War's approval on recommendation of the arms and services.
      (5) Priority No. 5—Development of suitable equipment for the proper maintenance and servicing of approved types of motor vehicles.
   b. No public funds will be expended for the development or test of passenger automobiles without prior approval, in every case, by the Secretary of War.
   c. The development of a portable charging set, referred to in the basic communication, is approved.

In carrying out the above directive it was estimated that it would take about five years of experimental development. In any commercial automotive organization, the executives and engineers would have maintained the greatest secrecy during the experimental development period in order to work quietly to a logical conclusion. So far as Quartermaster planning is concerned, in the five years that have elapsed there has been publicity, controversy, and investigation, with frequent changes of personnel and directives. Continuity and clearness of thought and action have been extremely difficult. This is not a complaint. It is a simple statement of facts as they exist and affect the solution of this intricate problem.

IN AN attempt to coördinate the varied demands of the Army for an indefinite number of vehicle models and to keep the spare and repair parts involved from reaching half a million or more items as they did in the World War, the Secretary of War directed the development of truck chassis separately from their bodies. About ninety per cent of the Army's maintenance problem is in the chassis, whereas much of its operating problem is in the bodies.

In analyzing and classifying truck chassis, different meanings were assumed for the terms "type", "model", "make", and "class" which had been so carelessly used as to leave exact meanings often in doubt. As applied to vehicles: "type" means character of traction; as, full-track, half-track and wheeled vehicles, the latter being subdivided into 4-wheel, 2-wheel-drive types; 4-wheel, 4-wheel-drive types, and so forth. "Model" means a definite arrangement of component major units as determined by any set of specifications governing production. Each set of specifications is identified by a name and number. "Make" designates the name of the vehicle producer. "Class" refers to the character of the completely assembled vehicle as determined by the body and purpose; for example, 5- and 7-passenger sedans, cargo, dump, all-purpose, armored car, and many other classifications.

As applied to component units and parts: "type" is a general classification and "model" refers to the specific arrangement of parts as determined in any given set of specifications governing component units and parts manufacture. Each set of specifications upon which manufacture is based is identified by a name and number. "Make" designates the name of the unit or part manufacture.

Vehicle "types", "models", and "makes" must not be confused with unit assembly and parts "types", "models", and "makes."

Experimental development of military vehicle chassis conducted by the Quartermaster Corps in accordance with the War Department directives of March 15, 1930, had for its objective the development of definite chassis types described by general military characteristics, to be recommended for adoption as "standard types." A further objective was the development of sets of specifications and drawings representing several sample or pilot vehicle models of various required sizes designated in gross-ton weight to be recommended for adoption. Whereas adopted types could be considered fairly permanent, adopted models would be subject to changes from time to time in keeping with the changing demands of the Army and improvements in the industry. These types and models were actually constructed and demonstrated as "The Army's Test Fleet"—composed of four vehicle types and six groups of gross weights, making twenty-four basic chassis models.

The influence of this development is plainly apparent in both the Army and the industry where lines of demarcation between the more than ninety per cent conventional 4-wheel, 2-wheel-drive type production and the less than ten per cent multiwheel-drive type production have been broken down, with greatly reduced bid prices received by the War Department for its multiwheel or cross-country type vehicles.

IN COMPLYING with procurement directives of the War Department since the World War, the Quartermaster Corps has used three distinct methods; namely, the "selective method," the "planned transport" or "standardized method", and a "compromise method."

The "selective method," based on the principle of purchasing commercial vehicle models that came nearest to military requirements, failed to effect necessary coördination of all the factors in the Army's motor transport problem. It failed to control the spare-parts problem. It was expensive. It fell far behind the changes in industry, resulting in rapid obsolescence of military equipment. It had to be kept more or less secret from the industry to prevent interference from makers of vehicles not selected. It was definitely held to be illegal by the Comptroller General in that it did not permit free competitive bidding.

The "standardized method" is based upon the principle of writing specifications around the entire job to be performed, as described in the complete cycle of motor transport experience. It provides a practical means of procuring vehicles that comply with military requirements. It provides for coördination of all the factors in the Army's problem. It controls the spare-parts problem. It provides for great economies in maintenance and replacement, far outweighing any increase in initial costs. It keeps up with changes in demand and supply. It does not have to be kept secret. It complies with the law as interpreted by the Comptroller General inasmuch as it provides for free and unrestricted bidding on the part of every vehicle producer in the industry.

The "compromise method" used in the past has neither

corrected the evils of the "selective method" nor gained the advantages of the "standardized method." The Comptroller General has criticized it severely as "restrictive"—tending toward illegality in that it favors a few producers of motor vehicles in its attempt to broaden competitive bidding beyond the "selective method" and at the same time to shut out unsuitable vehicle models. It has provoked unethical lobbying and throat-cutting competition. It has resulted in investigations in Washington and much embarrassment to the present administration, to the Army, and to the industry. From a legal standpoint, there appears to be no satisfactory compromise between the following two extremes in policy: 1. Full responsibility on the part of the War Department for specifying in detail every vehicle model it requires in military use, regardless of commercial models produced by the industry, and 2. The surrender of all responsibility by advertising merely for trucks in such broad terms that all producers can bid in competition on their regularly produced commercial models.

IN CONCLUSION, the difficulty in solving the automotive problem of the Army and of the War Department and the confusion encountered by all who deal with the problem, are due in part to the number of Government agencies involved. The present responsibilities and authorities now reposing in these agencies, the likelihood of overlapping and of duplication of effort, and the field for conflict of opinions and directives, are indicated in the following chart and discussion.

The Government agencies and authorities involved with the problem of military motor transport are:

Agencies	*Coördinating Authority*
Group 1 Military vehicle requirement agencies	The Chief of Staff
Group 2 Military automotive procurement and engineering agencies	The Quartermaster General
Group 3 Industrial coördination agency	The Assistant Secretary of War
Group 4 Legislative and legal authorities	Interpretations and decisions by Comptroller General

1. MILITARY VEHICLE REQUIREMENT AGENCIES. Arms and services that have motorized and mechanized elements that must operate motor vehicles and perform limited maintenance and repair functions in the field, originate and develop the Army's motor vehicle requirements. This group includes the Quartermaster Corps, which is also charged with military automotive engineering, current procurement, and with automotive supply and repair for the entire Army, as well as with the operation and maintenance of a large proportion of the Army's entire motor transport fleet. The coördinating authority for this group is the Chief of Staff, assisted by the various sections of the General Staff. The General Staff is charged, in Section 5b of the National Defense Act, with the preparation of "plans for national defense and the use of the military forces for that purpose . . . . and for the mobilization of the manhood of the nation and its material resources in an emergency, to investigate and report upon all questions affecting the efficiency of the Army of the United States and its state of preparation for military operation."

With the modernization of our military forces involving motorization and mechanization and the "material resources" of the automotive industry relative thereto, the responsibility of the General Staff with regard to coördinating such phases of the problem as planning, production, procurement, operation, and maintenance of the Army's motor transport is apparent.

2. MILITARY AUTOMOTIVE PROCUREMENT AND ENGINEERING AGENCIES. The Quartermaster General, who is charged in Section 9 of the National Defense Act with "the purchase and procurement" and with "the furnishing of means of transportation of all classes and kinds required by the Army" as well as with "the transportation of troops and supplies by mechanical or animal means", is the responsible authority in the Quartermaster Corps. This corps is charged by the Secretary of War in regulations, orders and directives with the problem of automotive supply and repair.

ALTHOUGH the most important administrative functions of motor transport procurement, issue, operation, and maintenance are centered in the Motor Transport Branch of his office, many functions pertaining thereto which require close coördination are performed in different divisions and branches of the Quartermaster General's office and in the field, particularly at the Holabird Quartermaster Depot. One of the most important of all motor transport functions is that of military automotive engineering, which includes the translation of all military motor transport requirements into specifications for procurement of automotive equipment from the industry, and the surveying of the resources of the industry to keep the Army abreast of its developments and its resources. Military automotive engineering also involves experimental development to coördinate the military demand on the one hand, and the automotive supply on the other hand. In his direction of military automotive engineering and its application to the Army's motor transport fleets, the Quartermaster General is assisted by the Quartermaster Technical Committee, composed of representatives of all arms and services.

As a matter of fact, the function of military automotive engineering has always been seriously hampered in its work by lack of understanding as to its purpose, by lack of confidence in its ability, as compared with the more specialized automotive engineering establishments of the industry that do not work in terms of military requirements, and by interference from many different sources outside of the Quartermaster General's authority. The coördinating authority for this group is the Quartermaster General.

3. INDUSTRIAL COÖRDINATION AGENCY. The office of the Assistant Secretary of War is charged in Section 5a of the National Defense Act with "the supervision of the procurement of all military supplies" and with "the assurance of adequate provision for the mobilization of matériel and industrial organizations essential to war-time needs." The function of coördinating military requirements with the industrial resources of the nation and with commercial requirements naturally pertains to the office of the Assistant Secretary of War. This office supervises industrial surveys and coördinates the procurement plans of the various supply services. It passes upon procurement possibilities of military equipment prior to its approval or adoption as standard or substitute standard. The Assistant Secretary of War appears in Quartermaster planning to be concerned with the executives of the automotive industry rather than with automotive engineers who are naturally consulted in military automotive

engineering. The Assistant Secretary of War is assisted by military advisers detailed from the Army.

THESE three groups of Government agencies, concerned with the primary and most vital considerations of planning and procurement, and with the coördination of innumerable factors in the Army's problem of military motor transport are, of course, subject to supervision and final direction and coördination by the Secretary of War. Obviously, the problem presented to his office is too extensive and intricate for him to solve without advice and assistance, which he must obtain from the three authorities named above. If and when these authorities conflict in their opinions and recommendations, or if any one of them usurps the responsibility and authority belonging to another, the problem becomes seriously confused. The situation is further complicated by the fact that there is a fourth group of Government agencies or authorities that have a tremendous responsibility with regard to the subject of military motor transportation. This group is composed of legislative bodies and legal authorities not subject to direction or coördination by the Secretary of War except through presentation of clear-cut solutions and convincing presentation of the military problem divided among the Quartermaster General, the Chief of Staff, and the Assistant Secretary of War.

4. LEGISLATIVE AND LEGAL AUTHORITIES. Congress, in its acts making appropriations for the purchase, operation, and maintenance of military motor transport, determines many fundamental factors in the problem. By fixing limits of dimensions or prices to be paid for any one vehicle, it may preclude the possibility of obtaining a type or model that is absolutely a military necessity. Without technical advice received through harmonious military channels or even directly in Congressional Committee proceedings from the military automotive engineering agency set up by the War Department to study and assist in solving the Army's motor transport problem, military advantages in field mobility and economies intended by the Congress may not be realized.

Unless the military problem is clearly solved and presented to Congress by the Secretary of War, and unless the automotive industry is cognizant of military requirements and in general approves of the War Department's solution of its problem, Congress cannot be expected to act in accordance with the best military, or even commercial, interests. The problem is too technical and too intricate to be solved by legislative bodies unassisted by military and industrial automotive advice. Such advice or Congressional action must be tempered or influenced at times by various related interests, such as the entire transportation problem of the country, economics, politics, and the national defense.

The Comptroller General, in his interpretation of the Federal laws, is a major controlling authority in the problem discussed in this article. In his office, technical advice and assistance and coördination of military and industrial interests with existing law in view are often required. If the War Department fails to present in its defense of purchases the true or entire picture of its military requirements, the Comptroller General's ruling may be contrary to the public interest in the development of military motor transport, or in the motorization and mechanization of the Army, whereas a complete and clear statement of its requirements might clearly establish War Department purchases of automotive equipment as entirely and logically within the intent of law.

The coördinating authority for this legislative and legal group, and its coördination with the three groups within the jurisdiction of the Secretary of War, is difficult to name. Theoretically, the administrative authority constitutionally granted to the President of the United States is the only existing authority that can coördinate all these agencies of the Government. As in the case of the office of the Secretary of War, who is the President's administrative adviser and assistant in all military problems, the office of the Chief Executive is not the place for solving the problem presented in this article, although the administration has, on several occasions, been embarrassed by its difficulties.

That the problem of military motor transport and its coördination with commercial automotive interests is difficult of solution and is generally misunderstood, is evidenced by the grievous errors and unsatisfactory conditions in World War, Civilian Conservation Corps, and Public Works Administration motor transport planning, procurement, operation, and maintenance. The Army's World War experience in motor transport led to Congressional postwar investigation. In its last experience with Public Works Administration purchases, the War Department did not complete the procurement phase before serious trouble developed leading to Congressional investigation. Assuredly, the problem merits further study by the highest authorities in the Army and War Department and, to some extent, reorganization of the functions of the above-referred-to agencies and authorities involved.

FINALLY, a word regarding national policy is pertinent. Great Britain, Japan, and other foreign nations have recognized their war-time motor transport requirements to such an extent as to adopt policies of subsidizing commercial automotive manufacturers and vehicle assemblers who produce commercial, peace-time vehicles that meet military specifications. Some of these nations even subsidize the purchaser as well. In other words, they impose their military requirements upon their commercial practice with some degree of recompense. In the United States at the present time there is no thought of such a subsidy. Nor is it needed if the study herein is correct. Present Government policy in this country, however, appears to be based upon the belief that vehicle types and models that fully meet military requirements are not practicable of production in quantity in time of war nor legally procurable in time of peace. Therefore the nation must be satisfied with commercial vehicle types and models in its military establishment. In other words, the United States in opposition to foreign policy imposes its commercial practice upon its military requirements.

In writing this article, no criticism of any office referred to, or attempt to indicate responsibility for faults and errors that have existed, is intended. Nothing is desired but a frank presentation of a national problem that is undoubtedly of major importance. Its solution must not be deferred until time of war, for in that event it will be too late to solve it satisfactorily. By constructive discussion of plans already partially developed and operating, and by their prewar investigation by the War Department with a view to their improvement, completion, and perfection, may the United States forge a new double-edged tool of great public value equally effective in its commerce and its wars. (*The end.*)

Sheridan's Cavalry at Appomattox

The Climax in a War of Maneuver

By Col. William W. Edwards*

DURING the winter and early spring of the momentous year 1865, the Commander of the Union Armies, like a watchful bulldog, went to sleep each night with one eye open, expecting to awake the next morning to find that his uncertain antagonist, taking advantage of the conformation of the James and Appomattox rivers, had gone south leaving only a picket line along his defenses.

The spring campaign awaited only Sheridan's return from the Shenandoah Valley for his cavalry had by this time become indispensable. When Lincoln and Stanton, convinced that the Civil War could not be run by a committee, had called General Grant to look after the destiny of the Union, Grant immediately decided that what the Army of the Potomac needed was an independent cavalry corps of compact masses, and to command it he selected an infantry division commander he had known in the west, Gen. Philip H. Sheridan whom he judged to have the essential characteristics of a leader of cavalry. To his credit General Sheridan already had three successful raids in the Wilderness and another victorious independent campaign in the Shenandoah Valley in which he had used cavalry and infantry in conjunction. After his seasoned troops returned from the Shenandoah and had taken several days at City Point on the James (the Union base), to rest the men and reshoe the horses, a delay made necessary by months of arduous service, Grant forthwith sent Sheridan by way of Dinwiddie Court House with orders to cut the two main Southern lines of supply, the railroads to Lynchburg and Danville so as to "leave nothing for Lee to stand on", and then, as soon as he could, to move on to Five Forks, at the right and rear of the enemy's line. Five Forks was recognized by both Grant and Lee as a place of great moment for it marked the intersection of five important roads. One of these led to the Danville railroad, another straight to Lee's right flank.

At this serious time, an ally to be reckoned with unexpectedly entered the lists on the Confederate side. During the last days of March, the spring rains fell so incessantly that small streams were swollen beyond their banks and soon became prodigious lakes, which engulfed roads, making travel across country slow, difficult and often impossible. Wagon mules bogged to their bellies. Camps became quagmires. Against these unprecedented conditions of weather and terrain there issued from Grant's headquarters orders for a temporary cessation of hostilities. All his subordinate generals in the field considered this as necessary and final—with one exception. At the end of the rainiest day in the calendar the members of Grant's staff were gathered round their headquarters' camp fire of split fence rails, around which were placed numerous other fence rails upon which they were standing to prevent sinking into a sea of mud, when out of the gloomy darkness they saw emerge a small group of horsemen led by a sturdy little broad-shouldered man on a powerful grey mount which sank deep in the mud at every step. As this leading horseman dismounted, the firelight disclosed the familiar bronzed features of Sheridan. He was holding in his hand the very order which had been the subject of their evening's discussion. But his face and manner, in contrast to those about him, evinced an enthusiasm which no rain could dampen. At his earnest request he was shown to Grant's tent and as the result of that interview Grant decided to capitalize the confidence of one of his generals by spontaneously changing his previous written orders—"heavy rains will make it impossible to do much until it dries up a little"—to the brief virile verbal one, *"We will go on"*.

AFTER Cold Harbor, Grant had no further intention of attacking Lee in his intrenched position. His idea now was to tempt him to come out and place himself in a position where he could be attacked. The Confederate line of earthworks engirdling Petersburg and Richmond extended weakly for about thirty-five miles. Four miles due west lay their detached fortification of Five Forks. To look at it on the map, it might well have appeared to Lee as a stepping stone to his inevitable "getaway". Warren's Corps on the left of the Union line, Sheridan's cavalry at Dinwiddie and Five Forks formed the apexes of an equilateral triangle. Grant gave Sheridan orders to move in his own way with full reliance that the Army of the Potomac would "engage or follow the enemy as circumstances dictated".

Divining Grant's intentions Lee hastily sent reinforcements to Five Forks consisting of all of his cavalry under Fitz Lee and five infantry brigades under Pickett and then—as of a sudden impulse—on the morning of March 31, 1865, launched a counter-offensive with other troops upon Warren's Corps, thus uncovering Five Forks and giving Sheridan a golden opportunity. But neither did the Confederate forces at Five Forks wait to be attacked. By a swift onslaught on March 31st they rushed at Sheridan's cavalry—the only troops then under his immediate command—and forced him into a perilous position in a swamp. Yet even there, he remained the consummate master of the show. Did he not have Grant's express permission to attack in spite of "hell and high water"? And attack he meant to make! In the face of superior numbers, he talked over his simple battle plan with Merritt and his other subordinates till they knew it fairly by heart: he proposed to have his cavalry drive the enemy back to Five Forks and while keeping him within his works there, make a feint at turning his right, and under that "curtain of horse", to bring up an infantry corps and swing it full force, double-fisted fashion, against the enemy left. The next day (April 1, 1865) being his appointed time for a change of tactics, the rain had fortunately ceased but the roads swam with mud and such billows of fog rolled over the woodland it was scarcely possible to differentiate friend from foe.

THE Confederate cavalry under Fitzhugh Lee was drawn in. The Confederate infantry extended to the right arching the roads which radiated from Five Forks. Merritt, with two Blue cavalry divisions (Devin and Custer), to the fore fol-

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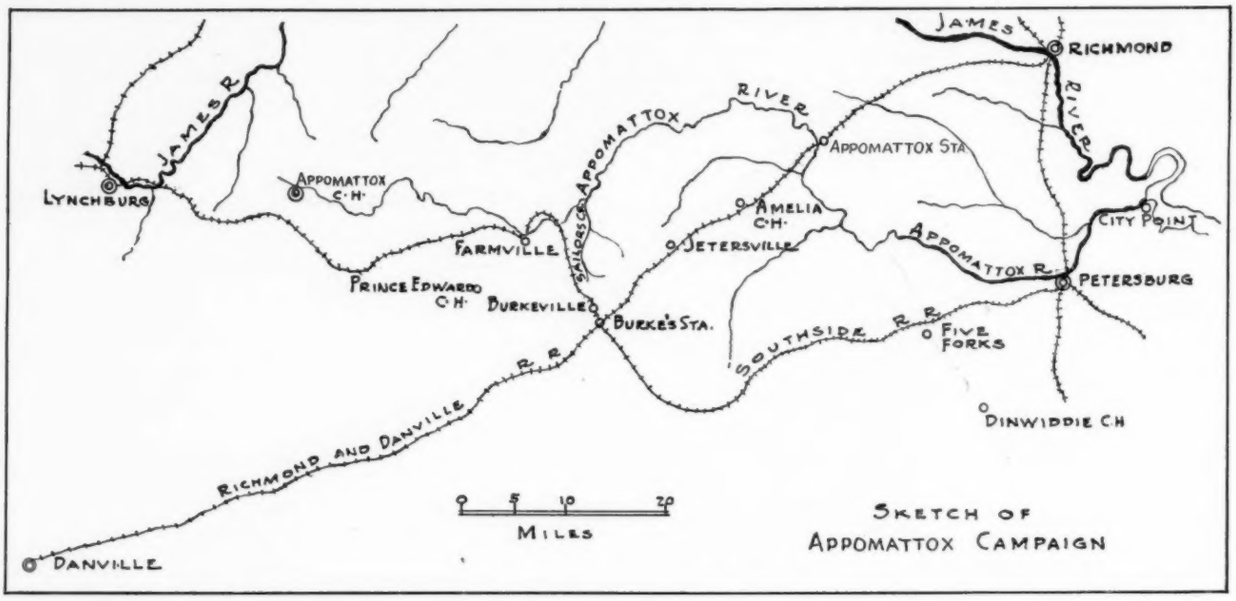

lowed by Crook, acted as a pivot upon which Sheridan expected to turn the tables upon the foe. Though the fields over which they maneuvered were treacherous with quicksand and the woods difficult with grapevines and undergrowth, Merritt's impetuous charges soon expelled the Confederates from their skirmish lines of hasty rifle pits. As they retreated, Pickett emerged from his breastworks and struck between Merritt and Crook. Gregg's mounted brigade arrived barely in the nick of time and the Union horse artillery, extricating itself from the mud at an opportune moment, was enabled under cover to Custer to place every gun in an advantageous position, so that as Pickett advanced in deep lines he found the critical gap in the Union line filled. Amid showers of lead from Merritt's carbines and Custer's repeating rifles and salvos from the guns, Pickett's broken lines were very glad to recover the shelter of their redoubts. Thus far it had been on the Union side a cavalry battle.

Sheridan had asked Grant, the day before, for a corps of infantry to deal the crowning blow. He was very anxious to have the Sixth Corps which had served with him in the Valley but it was engaged at the other end of the line. The Fifth Corps under Warren was promised instead. But the promise had not been fulfilled. The Corps was long past due! The morning hours sped away amid the heat and fire of combat while staff officer after staff officer rushed to the procrastinating Warren with urgent messages to hurry his columns. These demands fell successively on deaf ears for Warren was cast in a different mold and had to wait until everything was right to move. Meanwhile Sheridan on his black horse, "Rienzi", the same he had ridden from Winchester to Cedar Creek—dashed hither and thither along the battle front, greeting cheerily each veteran regiment as it passed. Then, with Warren's prolonged, inexplicable delay, he dismounted and paced up and down like a caged tiger vehemently announcing to his helpless staff: "We have only a few hours of daylight left. My cavalry is rapidly exhausting their ammunition. In the morning all conditions may be changed. This battle must be won before the sun goes down". At last one division of Warren's Corps came up. He put it at once into the fight under his own personal orders, being now able by preponderating numbers to overlap the Confederate left. In midafternoon, by which time more of Warren's belated Corps had dribbled in, preparations were begun for the assault. The breastworks at Five Forks were of strong parapets of logs with earth redoubts at intervals protected by heavy slashings thrown out in front. The main line ran along White Oak Road (one of the five radiating from the Forks), for upward of a mile; on the left flank they "retired" the interval thence to a small stream called Thatcher's Run, being held only by a skirmish line. The sun had already set before Sheridan's forces were ready. Amid the playing of their regimental bands, dismounted cavalry and infantry intermingled swept over the revetments in one tumultuous wave. "Rienzi," in sympathetic response to the shouts about him, needed not the spur of his rider. Jumping the earthworks he landed in the midst of thousands of Confederates who being practically surrounded realized they were prisoners. On one flank only, one possible avenue of escape remained—west along the White Oak Road. For miles in the grey dusk of that memorable April evening, the cry of the katydids through the woods was hushed by the clash of hoofs thundering westward along the White Oak Road, as Merritt's and Mackenzie's cavalry troopers chased Pickett's fugitives into the darkness of the night.

AFTER Five Forks the Civil War was a matter of days. Grant, having already sent Ord's Army of the James to turn Lee's right, when he received news from Five Forks, ordered a general assault, but it was unnecessary. Lee's lines of supply were at the mercy of Sheridan and Petersburg and Richmond were abandoned in quick succession.

Mr. Davis, the Confederate President, received one Sabbath morning at church a dispatch which caused him to leave abruptly with blanched face and the congregation to be dismissed with the notice that there would be no evening service. For in this dispatch was reflected the picture of a gray army hurrying westward in two converging columns with all possible speed to get over the mountains and reach Johnston in the south. Their shortest route was by Danville. They had but fairly started when Sheridan was at them like an unhooded falcon on its prey. Merritt struck Lee's southern column and drove it north. So hotly were Merritt's troopers

in pursuit that the gaunt men in grey unhesitatingly threw away ammunition and clothing to lighten their loads and hasten their march to the next stopping point where they might expect food. The two southern columns met at Amelia Court House. Grant's scheme was to pen Lee between the two rivers.

Burke's station, intersection of the Lynchburg and Danville railways, was the goal for which Sheridan's cavalry raced. So eager was he to check the Confederate retreat that when he reached the small town of Jetersville, just northeast, with his escort consisting of two hundred men of the First United States Cavalry, he deployed his handful of men across the road and held the position until evening when the others arrived, first Crook's and Merritt's cavalry followed closely by the Fifth Corps under his own command and then the remaining corps in succession of the Army of the Potomac. Before the infantry arrived however an emaciated, ragged Southerner on a fagged mule rode unwittingly into Sheridan's pickets where he was promptly seized and searched. Concealed in his worn-out boot were found two copies of a telegram from Lee's Commissary General which read as follows: "Army at Amelia Court House short of rations. Send 300,000 rations quickly to Burkville Station". One copy of this unsent telegram was directed to the Confederate Supply Base at Danville, the other to Lynchburg. It was conclusive evidence as to Lee's strength and two alternate destinations. And while the Army of Northern Virginia, by the miscarriage of the telegram, was forced to spend a precious twenty-four hours foraging vainly for rations at Amelia Court House, the Army of the Potomac had time leisurely to come up and take position across the railroad at Jetersville, effectually barring Lee's way to Danville.

AT Jetersville, Meade and Sheridan had another argument. They had quarreled from the beginning about the function of cavalry. Meade could not see the use of it. It was inevitable under these circumstances that they should continue to disagree. Here at Jetersville in a critical situation Meade fell sick and Sheridan had to post his corps for him. Meade was for waiting till they all arrived before the attack; Sheridan was for attacking at once. Meade wanted Sheridan under his command and Sheridan didn't want to be. *His* supreme desire was to cut loose as he always had and get around in front of Lee instead of following in a stern chase which he saw was no good. It took Grant to come up and settle the argument. Grant always upheld Sheridan but this time he decided that Sheridan would be henceforth under Meade. I am unable to discover however that the bold movements of the fiery little Irishman were one whit less hampered than they were before.

The next morning Meade advanced on Amelia Court House to find the bird had flown; Lee had departed the night before. His destination was now undoubtedly Lynchburg. Sheridan did not participate in Meade's advance. His cavalry on the left of the Union line was at once in a favorable position to harry Lee's march, so he lost no time in renewing the chase and continued it with his usual untiring zeal. He dashed rapidly along Lee's flank to find a vulnerable point. An insignificant stream called Sailor's Creek flowing northwest emptied into the Appomattox near an insignificant village called Deatonville. Here Sheridan interposed himself between Longstreet and Ewell cutting off the latter corps which constituted Lee's rear guard. Planting barricades on some high ground along the creek, Ewell tried to make a holding fight until the bulk of his force could escape westward through the woods and gain another road. But the crafty Merritt by shifting to the left gained the coveted road himself in time to play havoc with the Confederate trains, capturing part of the headquarters baggage and disclosing the fact, by a captured letter from General Lee himself, that his men had been so hard pressed they had eaten nothing but parched corn for four days. The bulk of the cavalry planted itself squarely across Ewell's road of advance. Sheridan's tactics were those of Five Forks. When he had Ewell in a vise he sent for the Sixth Corps, which had been his since Amelia Court House, and attacked Ewell's rear making him face part of his line about. Sailor's Creek was, as to numbers engaged, the bloodiest battle of the war, for Ewell fought with the desperation of a lion at bay. His countercharges were nevertheless thrown back like so much drift on a windswept sea; meanwhile the wavering grey lines were being pounded with the regularity and telling effect of a sledge hammer. Before the end of the day, six Confederate major generals had been captured and Lee's already decimated army was lacking one of its best corps. A staff officer was hurrying to Grant with the prophecy: "If the thing be pressed, I think Lee will surrender". Grant sent the message to Lincoln, who happened that day to be at the Union base on the James. Lincoln with characteristic brevity replied: "Let the thing be pressed". But Sheridan needed no such reminder. In a year his cavalry corps had reached an efficiency to respond to his instant demand. Hardened by service, its commander seemed himself insensible to fatigue. Immediately he took decisive steps to get possession of all roads shutting off any further chance of Lee going to Danville.

LIKE hungry hounds from the leash Merritt and Mackenzie were again away to "head them off" and in another one of his whirlwind movements Sheridan threw his cavalry across Lee's path—now in the direction of Lynchburg—to hold him there until the infantry could come up to deal another blow.

It was exactly a week since Five Forks; the horses of the Cavalry Corps worn by rapid marching and poor forage had still enough in them for a final dash. It was the circle of the hunt. The Lynchburg railroad—the last slender thread between Lee and starvation—was demolished beyond repair.

From the windows of a little farm house just south of Appomattox Station serving as cavalry headquarters Sheridan could discern through the evening shades in the valley below the bivouac fires of what he had left of Lee's army. On the other side of the farther ridge was Meade's Army of the Potomac, waiting for the morrow's attack which never came. The Army of Northern Virginia had been brought to bay for the last time. As Sheridan told Grant at the beginning of the campaign he wanted his cavalry to be in at the death and there it was.

Did the taciturn man, with the black beard and black cigar, his shoulders bent with past responsibility, his general's stars resplendent from a private's blue uniform grey with dust, who rode over to the McLean House the next day to receive Lee's surrender, remember perchance on the way that his own ambition in the early years of the war was to be Chief of Cavalry of the Army of the Potomac and did he think he could have done it any better, if he *had* been, than the one whom he selected, Philip Henry Sheridan?

What Price Automatic?

Comments on the Development of A New Arm, II

By Melvin M. Johnson, Jr.*

MODIFICATIONS of the short-recoil type of actuation have been numerous in the Patent Office. However, there are very few of these inventions in common use. The reader undoubtedly has observed that most automatic pistols use a short-recoil system. The Colt pistol (Browning patent), which we discussed in Part I, and the Luger, are outstanding examples. But, as we have pointed out repeatedly, there is a substantial difference between pistol and high-powered rifle cartridges. Thereby hangs the tale of woe.

A hasty examination of patents in the short-recoil class discloses much misdirected ingenuity. Invariably, as in other cases, the inventor was seized with an idea. One idea brought up another, and each idea adorned the weapon. Probably the most consistent defect, however, has been the failure to provide an adequate locking system, a point upon which we have already commented.

Many patents disclose methods of unlocking a breechblock after or during the interval of recoil, in time, nevertheless, to utilize the residual gas pressure for retraction. It would seem that such a system is impractical, in view of the number of unsuccessful experiments in that direction. I suspect one fault is this: the barrel has a tendency to hit the receiver or frame rather violently at the end of its recoil. Paul Mauser mentions further difficulties in one of his early long-recoil patents. Moreover, it seems impossible to use a Mauser-type, rotating bolt with such a system, because by the time the bolt has rotated, the pressure has vanished. While the pressure is high, a rotating bolt of the Mauser type cannot be unlocked very well, unless the lugs are slightly beveled. But (if the reader will pardon my constant use of the inevitable "but") beveled lugs cause the bolthead to move back from the base of the shell, and such a removal of support produces blown-out primers, or ruptured cases, as previously explained. Therefore, many other kinds of locking systems have been tried out, at least, on paper. A great majority of these breech devices are far too complicated, if not too weak, for military purposes.

The situation is quite discouraging. We ruled out gas-actuation. We could not use lubricated cases so the retarded blowbacks were discarded. We disliked the long-recoiling barrel. Now we find that the latter has the advantage of accommodating a counter-recoil brake or buffer, whereas with the short-recoiling barrel, due to the necessity of using residual pressure for retraction and for other reasons, we cannot use a brake very well. The brake probably would disrupt our timing. Even if we found we could overcome these difficulties, what kind of locking mechanism could we use? Already we have admitted that the Mauser system is the simplest and most reliable for our military cartridges, yet apparently we cannot rotate a Mauser bolt under pressure without encountering further complications.

Suppose we could design a bolt or breechblock which would rotate or unlock under pressure, without allowing the cartridge case to be unsupported. Then we might have so much unlocking before the pressure has dropped that the net result would be a breech system of insufficient strength.

Here, we must admit, gas-actuation has its points, for with some gas systems we could use a conventional rotating bolt, which would remain completely locked during the interval of high pressure.†

IN VIEW of the above complications, we might use the force of barrel recoil to impart power to an actuator. The reader may recall our discussion of the "croquet-ball" principle in connection with retarded blowbacks. Instead of a movable bolthead we use a movable barrel, in contact with the actuator. When the barrel recoils it imparts a momentum to the actuator which, in turn, causes the bolt to unlock by the action of a cam or by similar means. There should be quite a substantial blow from the recoiling barrel which we could harness up.

Analytically, the bolt or breechblock recoils rather than the barrel. The bolt is locked to the barrel and therefore pulls it back upon firing. Obviously we could put the actuator in contact with the bolt to get the same effect. Another method would be to allow the bolt or barrel to move a short distance and then hit the actuator. Any one of these methods ought to cause the bolt to be unlocked and retracted with enough force to compress a mainspring.

Such is not the case, however. Where the barrel or bolt is in contact with the actuator, a movement of one-quarter to one-half of one inch produces just enough power to compress a conventional mainspring about five pounds. That is barely enough power to unlock the bolt, so residual gas pressure must be used for retraction. The amount of barrel movement required to unlock the bolt takes too much time. Thus the bolt unlocks too late to utilize the residual gas pressure. Moreover, the lugs must be beveled slightly to permit immediate rotation.

If the barrel is allowed to move a short distance, hit the actuator, and "follow through", the mainspring is compressed about fifteen pounds. If it were not necessary to compress the mainspring, this force would be enough to unlock the bolt and retract it. Therefore, one inventor tried to "rig up" a method of multiplying the barrel movement so as to compress the spring by that power. Then he tried to rig up a device to connect the compressed spring with the bolt. You can examine his scheme yourself if you want to take the trouble to look through some 380 patents in the slidable-barrel class to find it.

To utilize residual gas pressure for retraction and spring compression we might try to make the bolt unlock at once.

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Part I of this article was published in the September-October, 1936, issue (Vol. XVII, No. 98, pages 78-82).

†I have just read with interest the recent article on the Hudson automatic by Lieut. Col. Calvin Goddard in ARMY ORDNANCE, May-June 1936 (Vol. XVI, No. 96). The idea is most ingenious. I respectfully submit that this design is far too complicated to be of practical use to the service, especially in the class of "small arms".

To do that we would require an objectionable number of parts. Moreover, while the barrel is moving to hit the actuator, time is lost. Hence it is virtually impossible to utilize residual gas pressure by this method, and that force is essential.

If we ever should succeed in making any of the above recoil-actuator systems perform their task properly, the result would be another of those "mechanical monstrosities". I recall a remark attributed to the late John Browning, who, when shown a new "automatic" creation of some inventive genius, asked where the cheese was located! The gun looked more like a rat trap than a rifle. I submit, however, that Mr. Browning should have recalled the old adage about "glass houses". The writer once went to a machine-gun school, where students delved deeply into the Browning masterpieces. I admit I found no cheese, but I felt very much like a rat in a trap when faced with the task of putting those "Humpty Dumpty" guns together again. Nevertheless, the service has not been shown anything better to date in the machine-gun line.

THE SPRINGFIELD AND THREE SEMIAUTOMATICS

Bolt action: 1. The U. S. Rifle, Cal. .30, M 1903 (Springfield); *Semiautomatic rifles:* 2. Pedersen, Cal. .276; 3. Garand, Cal. .30; 4. Thompson, Cal. .30.

EXTRACTION of empty shells has not been considered in our previous discussion, but we cannot avoid the problem. A large percentage of jams occurs in the extraction of cases. Of course if every cartridge were lubricated, this difficulty would be overcome nicely.

The time of extraction has much to do with our problem. The reader is asked to recall our previous discussion of the basic methods of actuation in this connection. Extraction may take place: (1) when no pressure whatever remains in the barrel or chamber; (2) when some pressure remains; (3) when there remains sufficient residual pressure to retract the breechblock.

The .30 Mark I case tends to stick in the chamber. Those whose rapid-fire string with the Springfield has been interrupted by a recalcitrant empty case will appreciate that fact. A good rifleman or machine-gunner is always "fussy" with the chamber of his piece. A smooth, clean chamber is of paramount importance. On many guns it is difficult to gain access to the chamber. On the ideal automatic rifle or machine gun this factor should be considered carefully.

The conventional extractor consists of a hook or claw which engages the extracting groove or cannelure on the cartridge case. When the breechblock, on which the extractor is carried, moves back suddenly, the result is a violent "yank" on the cannelure and on the extractor. Once loosened, however, the shell comes out easily. Some rifles, such as the 1903 Springfield, have an extracting cam which gives the operator a leverage.

Before taking up automatic extraction, I wish to make this assertion, based on the bulk of our previous discussion: No automatic action is worth its salt unless it affords enough power to compress its own mainspring in a direct and simple manner. Our breechblock, therefore, necessarily must be retracted with a considerable amount of initial force in order

that the mainspring shall be fully compressed. Consequently, we may conclude that in any automatic the extractor and cannelure will receive a very sudden jerk as the breechblock begins to move rearward. Conceivably the extractor may break or the brass cannelure may be ripped. Pistol cases do not stick so tightly, and with pistols, as usual, this problem is not so acute.

The extractor must be extremely rugged and durable, yet it must be sufficiently springy to slip over the cannelure in the process of loading. Moreover, the claw must have a wide bearing on the cannelure to distribute the jerk; otherwise the claw or hook will rip through the thin brass head.

I submit that in mechanisms which use residual gas pressure for retraction, this process is not quite as difficult because the pressure, provided of course it is of the right amount, tends to push the shell out of the chamber. With mechanisms wherein little or no pressure remains, the shell "sticks anyway". However, with residual pressure, the breechblock "wants" to go back, and does actually "yank" at the shell to an appreciable extent before the internal pressure can cooperate in the extraction process.

I venture to say that many readers will disagree with the above statement. However, I submit that where the strength of the brass is sufficient to resist the pressure within it, the wall friction of the case under such pressure is not enough to overcome the tendency of the whole case to move rearward. For example, a .45 ACP case will move easily under maximum pressure against a movable breechblock without any lubrication. Consequently, a .30 Mark I case loaded not over 15,000 pounds per square inch will also move under that pressure in the same manner. Suppose, then, a full Mark I load is fired, and the case is allowed to move just after the pressure has dropped below, say, 10,000-odd pounds per square inch, by which time the bullet has left the muzzle. Will the case then tend to extract itself by virtue of this effect of the residual pressure?

If our cartridge cases ever are altered in the distant future, I humbly beseech more taper on the cases, and a heavier base. The brass is very thin at the extracting cannelure. Compare the .30 Mark I with the .45 ACP in this connection.

While we are engaged in building up an atmosphere of gloom, I must admit that several eminent authorities have declared that lubrication is mandatory and inescapable in any .30 Mark I automatic which uses residual gas pressure for retraction. Others maintain that the timing problem requires such fine adjustments in the mechanism in order to obtain just the right amount of pressure, that a service weapon built on this principle would not be reliable. I, however, belatedly invoke the maxim: "What you don't say cannot be held against you." I recall the case of Christopher Columbus in the year 1492, nevertheless.

Let us ignore all of these pessimistic considerations, and discuss instead our ideal automatic, and how we would like to build it, irrespective of all but the most immediate limitations.

THE IDEAL automatic-rifle mechanism should be suitable not only for the .30 Mark I semiautomatic shoulder rifle, but also for the .30 machine gun. As far as possible the construction should be identical, because in many combat problems riflemen are ordered to operate machine guns when the gunners are disabled. The machine gun should not weigh over fourteen pounds; the rifle ought to weigh under ten.

The rifle should have the conventional type C service stock; a rotating bolt of the modified Mauser type; a 1903 barrel; simple but adequate locking lugs and shoulders; a dismountable operating handle; a large, rugged extractor; an enclosed receiver with ejection port; a large, rugged ejector of the conventional type; a simple mainspring in the stock; a strut connecting the mainspring to the bolt; means of automatically unlocking and locking contained within the receiver; a 10-shot, detachable box magazine; a simple buffer spring; a rugged, durable, receiver sight.

If possible, the extraneous automatic parts should be limited to the mainspring and strut. The detachable box magazine permits the mounting of a telescope on the top of the receiver if desired. The bolt need not be held open after the last shot because the men will fire fast enough with ten shots in each magazine. The firing mechanism should consist of a firing pin which positively cannot contact the cartridge unless and until the bolt is locked; a conventional hammer and semiautomatic trigger mechanism.

The barrel should be dismounted by removing a retaining pin or nut and pulling it from the forward end of the receiver. The bolt should be dismounted by removing a heavy, protective lock-plate from the rear end of the receiver, disengaging the strut and handle, and withdrawing the assembly. Such parts as the bolt, locking shoulders, receiver, etc., should be turned out "round", because such parts are easier to machine. Special metals should not be mandatory. No fittings should require tolerances closer than two- or three-thousandths. Substitution of worn barrels in the combat zone should be made possible. Parts such as pins, screws, etc., should be of standardized design so that ordinary civilian shops could turn them out.

This rifle should use the .30 Mark I cartridge without lubrication. Ordinary variations in weight, friction, and mainsprings, should not cause misfunctioning. By inserting a pin or plug it should be possible to convert this rifle into a hand-operated repeater. The number of gadgets should be reduced to a minimum, for the less there are, the less chance there is of misfunctioning. The rifle should be so simple that any ordinary recruit could understand it readily. The barrel should be exposed to air and not covered over. Durability should not be sacrificed to reduce weight. The entire rifle should not require more parts, or any parts more complicated than a 1903 Springfield.

In a word, my name is not Thomas De Quincey, and this article is not entitled "Confessions Of An Opium-Eater".

Bear with me further, if you please. The machine gun, aside from the feed, tripod, and cooling devices, should have less parts than the rifle because no hammer and semiautomatic trigger mechanism would be needed. The machine gun would be cocked with the bolt retracted by means of a simple sear. With the locking of the bolt, the force of the mainspring would permit the striker to fire the cartridge. Otherwise, the same parts would be used and the same principles would be applied as with the rifle. However, the ejection would be on the bottom, and the magazine would be inserted from the left side.

For infantry use, a 40-round box magazine would be far simpler than a complicated belt feed. Moreover, if air-cooling were used, the gun would get a short cooling interval every forty rounds at least. There being a simple, speedy method for dismounting the barrel, a gun crew might prefer to change

barrels with their asbestos mitts, than to carry water. Extra barrels on the Cole cart, or carried by hand, would not cause serious inconvenience. Machine-gun barrels, incidentally, have been known to wear out in the combat zone. If the warfare is truly mobile, 12- to 14-pound machine guns could keep up with the riflemen, and Cole carts need not be used.

In answer to the comment made by the Chief of Infantry in a recent address, that fire power and mobility are not very easily reconciled in the Infantry, I submit that a machine gun on the above lines would aid in the solution of the problem. The same type of mechanism might be used for antitank and antiaircraft guns of heavier calibers, but that is beyond the scope of this discussion, though not, I submit, beyond the realm of possibility.

The foregoing analysis of the ideal mechanism purports to cover the main points briefly. Some of the readers may not coneur on these points. If so, I shall be satisfied, at least, if I have succeeded in stimulating thought in this direction.

Again let me remind you that it is our mission to equip the Infantry with a weapon which will fulfill all of their requirements as far as possible. The weapon, however, must be designed for production, for if the manufacturer cannot build the instrument economically and expeditiously, the Infantry cannot obtain numerically adequate armament.

Last, though not least, we must consider the inventor and the difficult problems which confront him in his attempt to satisfy both the Infantry and the Ordnance Department. Some of those problems we have discussed in the foregoing chapters.

COÖPERATION, one of the nine principles of war, must be given careful consideration by all hands. This aspect of the problem of developing a semiautomatic rifle or machine gun is not appreciated sufficiently. Every problem involves a number of factors. No one factor is responsible solely for a given result, although some of the attending factors may be passive rather than active. Hundreds of inventors have failed to achieve success in developing an automatic gun because they did not understand certain important factors. Earlier in this discussion we commented on the necessity of satisfying the manufacturer, the soldier, and the "ammunition department". Unfortunately, many inventors do not appreciate this multiplicity of requirements.

Primarily, an inventor is a man with ideas. The process of inventing consists of converting an abstract idea into concrete reality. Invariably, as one development suggests another, modifications are made during this process. In some cases the inventor is a machinist who has conceived of a "perfect" mechanism. Some inventors, however, are expert engineers who draw every detail of their idea on paper so that their machinists can follow the plans without consultation. A skilled machinist is mandatory, yet, I submit, the inventor himself must have a very broad conception of the entire subject in order to succeed. A gun drawn on paper, with every pin in its place, may turn out badly in a machine shop, or in a preliminary ordnance test. A gun which, to an expert machinist, is a gem of purest ray serene, invariably fails to satisfy military experts because of one or more inherent defects. Often the particular drawback could have been pointed out before the gun ever was built. Had the inventor troubled to inform himself of factors most important to the soldier or manufacturer, he could have avoided considerable grief. Moreover, many inventors ignore entirely the problem of mass production. They persist in developing mechanisms which require the most exact fitting and machining. They are oblivious to manufacturing costs.

The expert engineer, in turn, forgets that the horse should precede the cart. It is better in the experimental stages to make the elaborate drawing from the gun, not the gun from the drawing. Experiments are inevitable in the development of a weapon. It is almost impossible to anticipate every factor in advance. The experimental model should be prepared for a series of tests. Once initiated, the experiments should be thorough. Many inventors, however, get new ideas every night. Instead of filing their latest schemes for future test, they interrupt their work before one test is completed and try out something else. Then, before the succeeding scheme has been given an adquate trial, another idea pops up. The results, if any, of such irrational experimentation are rarely fruitful.

SO far we have criticized the inventor. We have indicated that he should inform himself of the exact requirements of the using arms. However, the military experts often disagree. Some want one thing, some another. Production requirements are more easily ascertained. The inventor, therefore, should be familiar with firearms and their use. He should, to some extent, understand the technique of employing small arms in combat. The "soldier", on the other hand, should make some concessions to the inventor. For example, much emphasis is placed on a short, compact receiver. The semiautomatic rifle must balance perfectly or it is "no good".

In conclusion I hasten to assure the reader that we have omitted many points in our discussion of this subject. However, I submit that we have covered most of the important ones. We admitted at the outset that the subject called for a large book. You may accuse me of ignorance, in that I failed to mention some of your pet mechanisms, so I remind you that this was not an historical survey. Furthermore, you may disagree with my analysis of various methods of actuation, so I ask you to remember that we all learn something new about guns every day. High-speed cameras, electrical timers, and other devices, furnish us with more accurate information about our mechanisms, often proving that our original analysis was incorrect. As far as I know at this writing, my statements are entirely correct regarding the action of various self-loading systems. Where, however, I have drawn conclusions relating to the actual failure of a mechanism to operate satisfactorily, I am ready and able to prove my pronouncements. If this discussion has enlightened the reader to any extent on the subject of automatic rifles, I shall feel satisfied that my mission has been accomplished.

"What price automatic?" When the ultimate automatic is produced, that question will be asked. I recall a passage from an opinion of the late Justice Oliver Wendell Holmes which more squarely raises this question. He said, in part: "I should have my doubts, as I have them about this statute—but they would be whether the bill that has to be paid for every gain, although hidden as interstitial detriments, was not greater than the gain was worth; a matter that it is not for me to decide."

I respectfully conclude that the bill to be paid for the ultimate automatic will be far, far less than the gain is worth; a matter, however, that it is not for me to decide. (*The end.*)

The World War in History

A Survey of Source Materials in the Hoover War Library

By Ralph H. Lutz*

THE year 1934 marked the twentieth anniversary of the inception of the Hoover War Library, for in 1914 with the outbreak of the World War, the idea of a war history collection at Stanford University began to take shape in the founder's mind. In September 1914 Mr. Hoover organized the Commission for Relief in Belgium, an organization which for four and a half years kept alive the Belgian population living under German occupation. The archives of this organization and the contemporaneous historical collection which he gathered during the war and at the period of the Paris Peace Conference formed the nucleus around which has been developed the present Hoover War Library—a library of books, pamphlets, Government documents, files of serials and newspapers, manuscripts, proclamations and posters, military maps and war film, which now overflows the space allotted to it on three stack floors of the Stanford University Library Building and continues to grow constantly.

SCHOLARS and military historians have always experienced great difficulty in obtaining accurate and objective information on the causes of, and developments leading to, the conflicts of their own and past times. This difficulty arises not only from a personal, if unconscious, prejudice, but also from the influence of a general and public distortion of facts.

Take for example, our own War Between the States. Only now are we beginning to obtain authoritative and unbiased histories of its characters and events.

The history of the World War will be no different. Even today we are witnessing biased attacks on the motives and personalities of those days. But the records of that stupendous struggle have been preserved, guaranteeing to the future historian more complete sources of accurate information than were accessible to his predecessor. Such a source is the Hoover War Library.—EDITOR.

A brief general survey of this Library was published in ARMY ORDNANCE (Vol. X, No. 59, March-April, 1930). This account provided the military public and the investigator of World War military history with information concerning the economic, social, financial, political and military materials of unique value for critical studies of that period of the world's progress when the structures of our civilization were in the balance. In this paper the present writer plans to present the facilities which the Library offers for research in the general field of the military history of the great war.

THE military materials in western European languages in the Library are divided into the following categories: governmental publications and documents of belligerents; general military periodicals; war-time camp and trench papers; regimental and divisional histories; miscellaneous military works including contemporary studies of military science; general staff maps and army maps; proclamations and posters including those pertaining to war loans, recruiting, relief, food conservation, occupied areas and zones of operations. Moreover there is deposited in the Library a vast amount of archive materials which has been placed in vaults because the donors have restricted its use by contemporary scholars.

Among the unique materials in the collection of governmental publications of a military character may be noted the official publications issued by belligerents in the administration of territory held under military occupation. These materials include propaganda as well as official decrees and regulations. A representative set in this collection is *Les Avis, Proclamations et Nouvelles de Guerre Allemands Affichés à Bruxelles.* A check of the *Serial Publications of Foreign Governments* reveals that various editions of the publications of German legislation for Belgian occupied territory are in a number of American libraries, but that the Hoover War Library is the only American collection having this valuable material *in extenso.* The Library's holdings also include official publications of military occupying powers in northeastern France, Poland, Estonia, Iraq, Latvia, Lithuania, Rumania, Serbia or Yugoslavia, and the former German colonies: Western Samoa, Cameroons, South West Africa, South Sea Islands, Nauru, and Ruanda-Urundi.

In the general collection of the official military publications of the principal belligerent powers are: publications of the Kriegsministerium of the Austro-Hungarian Monarchy; the documents of the Belgian Commission d'Enquête sur la Violation des Regles du Droit des Gens, des Lois et des Coutumes de la Guerre, Les Armées Francaises dans la Grande Guerre of which thirty-three volumes have been published to date; documents of the German Kriegspresseamt, Reichsmilitärgericht, Reichsarchiv and Kriegsministerium; documents of the British Ministry of Munitions, the Committee of Imperial Defence, and publications of the War Office; publications of the Italian Corpo di Stato Maggiore; and finally an extensive collection of the official publications of the American Expeditionary Forces and of the American Forces in Germany.

As representative of the nongovernmental periodicals of a military character may be mentioned the files of *Militär Wochenblatt* and *Revue Militaire Française.* War-time military journals number over three hundred files, notably *Gazette des Ardennes, Kriegszeitung der 9. Armée,* and *Bulletin des Armées de la Republique.* These journals often supplement such official and rare publications as *Verordnungsblatt für das General Gouvernement Warschau* or the French Government's *Journal Officiel des Territoires Occupés.*

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For a detailed study of military operations the histories of regiments and divisions, which were in line or in reserve, are of distinct value. The Library contains approximately one hundred twenty-five British, one hundred fifty French, five hundred German, one hundred fifty-five American, one hundred Russian and fifty miscellaneous histories. Many of these have already been included in authoritative special bibliographies or have been cited by military historians in special works. Supplementing these histories is a collection of nine thousand titles of miscellaneous military works.

TO list representative titles from this collection would be to name the principal military historians and authors of memoirs. It has been the aim of the Library to cover every phase of World War military operations. For certain campaigns relief models have been acquired as aids to research.

The collection of military maps numbers over five thousand items, including sets of general staff maps from the major belligerent powers. These sets have been augmented by gifts from twenty private collectors who have however in general restricted the use of their collections by scholars.

The Library's collection of military propaganda is more extensive than the great European collections at the Bibliothèque et Musée de la Guerre at the Chateau de Vincennes near Paris, the Weltkriegsbücherei at Schloss Rosenstein near Stuttgart or the Imperial War Museum and Library at Bedlam, London. Its materials have been surveyed in recent publications. The projected study of World War proclamations and posters by intelligence officers of the present German Army emphasizes the importance of military propaganda not only in occupied areas but also in the general conduct of modern war.

In addition to the military materials in western European languages in the Hoover War Library, there is also an extensive collection in Slavic languages. This section of the Library is rich in Polish, Russian, Czech and Serbian works. Two background collections cover the wars of Imperial Russia during the nineteenth century and the Russo-Japanese War.

The main Russian military collection is concerned with the 1914-1917 campaigns, the revolution and the period of intervention and civil war. It is divided into the following categories: military art and science; military drill and education; strategy and tactics; regimental and divisional histories; aviation; the Red Army; defense of the coast ways and communications; military journals and newspapers; and miscellaneous military works. Representative works in the first category are those of Golovine, Kamiński, Dlugowski, and Ganov. In the second group may be mentioned Kruglikov's texts written in 1917 and the study of Soviet military schools from 1918 to 1922 by Avinovitskii. Kakurin's strategical sketch of the civil war, Drabkin's lessons of the civil war and Karakhanin's military geography of the U.S.S.R. are representative works in the strategic group. Studies of the Russian military campaigns, which have not been translated into English include works concerning the 15th army corps in East Prussia; the retreat from Galicia in 1915; the break of the IX army in 1916; the destruction of the 20th corps in 1915; and the activities of the secondary troops during the World War.

The definitive study of the civil war is *Grazhdanskaia-voina* 1918-1921, published in Moscow, 1928. Trotsky's documents and orders as commander in chief of the Red Army have been printed in five volumes. Voroshilov has written an interesting study of the general problem of the defense of Soviet Russia, while numerous military writers have covered all phases of the campaigns of the civil war.

No Russian military collection would be complete without files of Proletarskaria Revoliutsiia, and Arkhiv Russkoi Revoliutsiia which contain a great number of personal narratives by commanders of the Red Army. The Hoover War Library possesses however, complete files of more than a score of other military journals, which are concerned with all phases of Russian military history from the outbreak of the World War until the present European crisis.

A considerable amount of original military source material has been received by the Library with specific restrictions as to its use by scholars. Eleven archives of former army commanders will become available for research during the next decade. As soon as these restrictions expire, the Library will publish descriptions of these collections.

Certain manuscript materials in this restricted group may however be mentioned at this time. Among these are: Supreme War Council documents; military documents of the Allied and Associated Powers for the Paris Peace Conference period; documents of the American Expeditionary Forces and of the American Forces in Germany; the Dorten documents on the separatist movement in the Rhineland; minutes and documents of the Inter-Allied Munitions Council and of the Inter-Allied Rhineland Commission; the Golovine collection of materials concerning the Imperial Russian Army; and the Library's collection of American reports on European military establishments for 1919-1920. In the group are also the papers of the following generals: Barsoff, Bermont, Budberg, Gourko, Heroys, Kappel, Kolchak, Kornilov, Krasnov, Mamontov, Martos, E. K. Miller, Samsonov, and Shinsky.

BY means of the Library's publications, of which ten volumes have now been published, a number of important military documents in these collections are being made available to all other libraries. Number 10 of this series is an English translation of the testimony of Kolchak and other Siberian materials. This important source for the history of the Russian civil war contains Kolchak's answers to questions relating to the Japanese War, the World War, the revolution of 1917, and finally his organization of the short-lived anti-Bolshevik territory in Siberia. In Hoover War Library Publication Number 4 entitled "The Causes of the German Collapse in 1918" are given Germany's own answers to the following questions raised after the 1918 revolt: Were we defeated in battle? Did those at home stab the fighting army in the back with the dagger of revolution? Why did the navy mutiny? Did the Pan-Germans and the Fatherland Party prolong the war for selfish purposes? Two additional military studies will be published in 1936.

An annotated bibliography of the military materials in the Hoover War Library is now in process of formation and will be published in the bibliographical series of the Library. All titles of original source materials concerning American military history will be furnished to the American Military History Foundation for inclusion in its directory of original sources.

It is apparent, the present writer trusts, that the primary objective of the Library is the development of research concerning the causes, conduct and results of the World War,

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Month by Month

WE pause to pay a measure of heartfelt tribute to the late Secretary of War, George H. Dern, who died August 27, 1936. As was the case with all who had acquaintance with him both in civil and military life, the Army Ordnance Association desires to pay homage to the life and work of this very capable, unassuming man, who guided the destinies of the United States Army through troublous days.

Secretary Dern

Long experience in the mining industry and in public life nurtured the sanity and liberality of his views and actions. Mr. Dern was born in Dodge County, Neb., September 8, 1872. He was graduated from the Fremont (Neb.) Normal College in 1888 and was a student of the University of Nebraska, 1893-1894. In the latter year he entered the mining industry in Utah where he became treasurer of the Mercur Gold Mining and Milling Company. He was general manager of the Consolidated Mercur Gold Mines Company in 1900 and was associated with this and other metal mining enterprises until 1913. During this period he assisted in the development and became the owner of the Holt-Dern metallurgical patents. He served as a member of the Senate of the State of Utah from 1915 to 1923. During the World War he was a member of the Utah Council of Defense. From 1925 to 1932 he was Governor of the State of Utah. He was appointed Secretary of War March 4, 1933.

During the slightly more than three years of Mr. Dern's secretaryship, the Army found in him a strong supporter, a wise administrator, and a decidedly human individual. At the beginning of his régime he fought with effective vigor against congressional attempts to reduce the strength of the Army. He made better housing conditions for Army personnel a major objective, officer-promotion reform an accomplished fact, the pay and promotion of enlisted men a constant interest. In his quiet way he exerted a ceaseless method of improving and promoting the best interests of the national defense. Today its efficient status is his great tribute.

The Army Ordnance Association and its work for industrial preparedness were signally honored when Mr. Dern, in March, 1934, was the honor guest of the Philadelphia Post. On that occasion he elaborated the previously declared policy of the War Department as to the production of ordnance in peace and war, defending in vigorous language the rôle of American industry in national defense. His address, issued by the Association in pamphlet form, is still in demand by interested citizens in all parts of the country.

Because Secretary Dern was a talented gentleman of high attainments, sound judgment and unobtrusive demeanor he was able to increase the morale of Army personnel in a remarkable degree. He likewise sponsored the programs for modernization of Army equipment, motorization, mechanization aloft and ashore. Gen. Malin Craig, Chief of Staff of the Army, said of him, "He worked unceasingly in behalf of national defense, sacrificing his health to the welfare of the country. Much of the progress made by the Army in the past three and one-half years was due to his intelligence, understanding and his eager devotion to the public interest." For these reasons his name will be recorded high on the roster of our great Secretaries of War.

To Mr. Harry H. Woodring, who has served as the Assistant Secretary of War since April, 1933, now comes the well-merited honor of directing the progress of our Army.

LIEUT. COL. ORVEL JOHNSON, Inf. Res., Director General, R.O.T.C. Association of the United States, performed a commendable service when he exploded the "compulsory" military training myth before the members of the Veterans of Foreign Wars. We see a great deal of propaganda these days about "compulsory" military training and about bills introduced in Congress to prohibit it. The constant repetition of the "compulsory" leads one to believe unconsciously that the statement is so. This is part of the Marxist propaganda technique and, as in other spheres of activity, it is producing results.

Exploding a Military-Training Myth

"The word 'compulsory' is absolutely foreign to the military law of this nation," writes Colonel Johnson. "It is fiction pure and simple employed to create disrespect for military education. The use of the term 'compulsory training'," he writes, "by the groups of pacifists, socialists, and communists, who oppose all military training and service, constitutes a deliberately false statement, designed to prejudice the public mind against military training in our schools and colleges in the units of the Reserve Officers' Training Corps, which, for convenience, is commonly referred to as the R.O.T.C.

"The determination of the question of whether or not a student shall take military training is first made by the student, when he decides to enter a school where it is required. Surely, his selection of such a school is not 'compulsory'. Upon entering a school where military education is made a pre-requisite to graduation, the student voluntarily submits himself to the exercise of the sound discretion of the school authorities. All schools, of necessity, must, and do, decide upon the character and the amount of work to be done by a student before his graduation from the school he has voluntarily entered. Military education is carried on in a de-

partment known as the 'Military Department', headed by an officer of the Regular Army, because of his peculiar fitness for the position. The school authorities in prescribing the major subjects of study, and the amount of work to be done upon each, include military education with history, science, languages, mathematics, etc., and naturally require their students to complete the required course in these subjects before graduation. It is this requirement to complete certain designated courses, those opposing military instruction refer to as 'compulsory'. Obviously, its use misrepresents the fact, for the purpose of misleading the public mind."

It is well to keep this point in mind when we hear or see the compulsory military training myth discussed. Any sort of compulsion, it seems, is anathema in the socialist philosophy. Indeed the hue and cry about compulsory military training comes down simply to this: that a student having selected an educational institution (very often free of charge) can by right say exactly what courses he will and what courses he will not follow. Education would be in a sorry mess if the undergraduate could lay down the law as to the entire curriculum he will follow. Military training being the major disciplinary experience, quite naturally many would reject it. They forget that the alternative is to choose some other school. Instead they prefer to condemn a particular school because one of its requirements does not meet their fancy and to challenge the idea of military training because—well most probably because everything military must be challenged and undermined, if possible.

A Central Depot of Equipment and Information

NEWS that the Imperial War Museum, London, is now established permanently in the modernized buildings of Bethlehem Hospital, Lambeth, recalls the rather desultory location of this famous reliquary in recent times. Its doors were closed at South Kensington in 1935, after a stay of some years, and prior to that it had been housed at several locations in the City. In its new location the Museum contains collections of a quarter of a million photographs, 60,000 books of war histories, honor rolls, maps, and matériel. Our esteemed contemporary, *The Royal Army Ordnance Corps Gazette,* tells us that "Ordnance war work from base to forward zone is well represented . . . Shown also is a bomb of 3300 lbs.—one of three intended with its fellows, for a raid on Essen, which the coming of the Armistice alone cancelled. There are relics of British and German 'aces'; guns, including the howitzers 'Mother' and 'Barking Kate', and the naval gun served by Boy Cornell, V.C., at the Battle of Jutland, which the new spacing enables one to see in their galleries without confusion."

What a splendid thing it would be if we had here in this country a counterpart of the Museum! And with a somewhat different purpose! True we have many notable military collections—but our thought runs more to a treasure house not only of the past but of the future especially. Our own National Museum has a good collection of World War matériel. The Metropolitan Museum in New York has a priceless collection of ancient arms and armor, Milwaukee has its great Nunemacher Collection, the Springfield Armory has its inclusive collection of small arms, the Aberdeen Proving Ground its museum of World War types of artillery, Atlantic City its Jarrett Collection of ordnance, and so on. And what individual collectors there are who have assembled—often to the point of requiring an additional wing on the owner's home—the finest specimens of particular "families" of small arms. To describe only a few would make interesting reading indeed!

But this idea (not original with us) of a central museum for and of the future, is of greater moment. The idea would be to establish at one centrally accessible point a great show room where every standard article of equipment used by the defense forces of the United States would be on view. With it would be complete details as to use and maintenance, nearby would be copies of the production drawings, specifications, processes of manufacture and bills of materials for the completed article and for every component part. Here would come the engineer to study design, the manufacturer to see the product "in the flesh", the inventor to delve into possible improvements. Here would come too, the civilian soldier to see the things he should know about. And here would come, let us hope, a goodly portion of that large body of Americans who have distorted ideas of the weapons of defense. Such an establishment would have many advantages, professionally, technically, and above all popularly. There are too many of our people who believe—or, at least, they say they believe—arms cause wars! These gentry could see (once in their lives!) what arms look like and what a job it is to build them after a war has started.

A huge undertaking? Indeed so, but one fraught with tremendous possibilities for the national defense. We believe the idea is sound and that it merits consideration. The cost, large though it would be, is warranted a hundred fold. We commend the suggestion to the military and naval authorities for transmission to the Public Works Administration. And Public Works should view it sympathetically. For ourselves we like fancy dog pounds, the latest in elephant houses and swimming pools, and orchestras and dramatics—all aimed no doubt to make America of the future (people and animals) a better place to live in. We would like to see some such move for making industrial preparedness secure. Along with many other good ways could wisely be included a Central Depot of National Defense Equipment and Information. It would be self-liquidating, self-sustaining, and self-assuring because a future postwar museum would not be so large if a present prewar museum like this were in existence.

Maneuvers of Men and Matériel

EVERY student of military affairs must be pleased by the promptness with which authoritative critiques of recent maneuvers by the Second Army were made public. Several analyses in particular—those by Maj. Gen. Charles E. Kilbourne, Commanding General of the Second Army, Brig. Gen. Dana T. Merrill, commanding the Sixth Corps, and by Col. Bruce Palmer, Cavalry, Commander of the Mechanized Force—are of substantial interest. General Kilbourne reintroduces the possibility of strategic surprise in battle now restored by the postwar development of combat aviation, mechanized forces, and dependable motor transport. It is his opinion that commanders in future wars will use these means to the utmost "to secure such initial advantage as might force upon the

enemy a settlement of the war before stabilization can become established." Colonel Palmer in his critique also says that present tactical methods in a war of movement have been established on a sound basis. In particular, and in addition to the movement of infantry in trucks, the antitank gun is a great menace. He said, "We have gone to great lengths to develop a neutralizing agency (smoke) to use against the antitank weapon because we fear the antitank weapon so much; and we cannot help feeling that in the fight where the weapon is conspicuous by its absence that things are made easy for us and in the fight where it appears in suitable numbers and is properly employed, that there is where mechanization will find its greatest opposition." General Merrill emphasized this point. He said: "A marked increase in antitank weapons is indicated not only for front-line units but for the protection of rear installations so that front line units shall not be depleted. While the caliber .50 machine gun may solve the problem, experiments should be made to determine the effectiveness of a light rapid-fire cannon similar in effectiveness to our former 6-pounder."

We have noted this element in the critical discussions of the maneuvers as but one instance of their value. Other problems of mobility, observation, communications, liaison, etc., were all brought out in proper relation as they are the very essence of peace-time maneuvers by large bodies of troops. But our first concern lies in the field of weapon design and utilization so that the problem of antitank media is of particular interest. Aside from the desirability of increasing antitank effectiveness by increasing the number of weapons for front-line units, there is the ever-present problem of the development of an antidote to repel new and more powerful devices. To us, therefore, the maneuvers and the splendid critiques emphasize a moral as much as they do a material problem. It was the tank that made its appearance just twenty years ago to solve the problem of the breakthrough. Immediately an antidote, partial at least, for this new menace appeared. For the time being the use of smoke is effective in shielding tank movement and thus in counteracting some of the power of the antitank defense. Whether there will be a more effective agent remains to be seen, but it is part and parcel of military evolution to see the newcomer promptly challenged by a new adversary.

Thus a war of machines that will "destroy civilization" is more than ever a hoax because the object of war is not to destroy civilization and, more particularly, the machine will always be the agent of the mind which controls it. There is room for detailed improvement just as there is demand for constant progress in military tactics and strategy with the things at hand. But over and above all else—and this we believe the maneuvers certainly showed—the moral is to the physical as three to one—a fact undisputed before and since Napoleon used the phrase. For the maneuvers of the Second Army in 1936 as with those of the First Army in 1935, we have reason to believe that they have done more for the peace-time efficiency of our Army than any other one undertaking, and that the advantages as well as the limitations of organization and equipment are taken to heart by all observers—both those in the military establishment and out of it. "Bone-head plays" there were a plenty, no doubt. But isn't that the exact purpose of maneuvers of large forces? If there are no lessons to be learned, maneuvers are unnecessary. If we are wise, we will have Army maneuvers on a grand scale annually to iron out the "bugs" of tactics and matériel.

Major Erwin's Part

IN THE last issue of Army Ordnance we made brief announcement of the death of Maj. John M. Erwin, late personnel officer for the Office of the Chief of Ordnance and a contributor to these pages. It is appropriate at this time that more fitting tribute to this young officer be made, particularly in view of his close association with this Journal. Moreover there are some conclusions that can be drawn on the military profession which the closing of this all too brief career brings into focus.

The military profession is unique; frequently misunderstood; often beleaguered. When it meets its obligations successfully, laurels are heaped high upon it; when it fails—whether through its own fault or not—condemnation is severe. Extraneous circumstances are seldom given full consideration. The military man, when the test comes, must measure up to his great responsibilities; duty well done is its own reward and his consolation. To meet these exacting requirements without reservation and with success demands the same type of energy and mental acumen of the members of this profession as it does of all other professional men. But the military career is at a disadvantage in that its real crucible of experience comes only at infrequent intervals—an entire lifetime may not bring the great test of combat. Hence, as we review the life and character of but one man, we are tempted to gauge it by the measure of his mental and cultural attainments and his readiness to meet the problems of war and peace with qualified judgment and unswerving loyalty.

Major Erwin typified these ideals in highest degree. He had lived through the holocaust of war when as an Infantryman at the front he saw battle at first range. He had practiced in peace all the precepts of soldierly conduct and tradition to which he was heir. Above all he was a student in the highest connotation of that term, and he constantly applied the lessons of his learning to the day's immediate problem. Those who called him friend saw in him the personification of the best in military philosophy and conduct. In his passing there is this consolation, that in traditional military fashion he met his last great task with all the fearlessness that marked his daily demeanor. And there is a greater consolation in the knowledge that the profession of which he was an exponent carries on in the personal lives of so many of his fellows. Though the loss of his type of officer is great and intimate, his profession is all the better for his having been a member of it.

An Ordnance National Park

THE Army Ordnance Association in coöperation with the U. S. National Park Service is forming a committee of its members to assist in locating any pieces of artillery of the Civil War period for permanent emplacement in the Petersburg National Park, Va. The undertaking has great historical merit and warrants the coöperation of all citizens who are interested in the preservation of our military battlefields. The Committee will also include several officials of the National Park Service.

The Committee is anxious to obtain any information as to the present location of any equipment of the types used at the Siege of Petersburg. It will endeavor to authenticate any material reported to it and will assist in making arrange-

ments for the transfer of such material to the Petersburg National Park for permanent display. Neither the Committee nor the National Park Service is in a position to purchase any of this equipment but it is hoped that ready and willing donors can be found who will gladly present any desired pieces for this purpose.

Within a short time the Association will publish in pamphlet form a description of the project and an itemization of the various types of artillery used in this engagement by both Federal and Confederate forces. It will be the purpose of the Committee to enlist the aid of all citizens who know of the location of any of these types and to assist in making arrangements for the permanent installation of such equipment at the Memorial Battlefield Park. We urge the interest of all members of our Association in this very worthy historical undertaking. Oftentimes members may know of the location of one of these pieces where it no longer serves a purpose commensurate with its historic value. The Committee will desire to know whether such pieces still exist, their location and whether they might be donated for this purpose. Very often in touring about the country or in discussing historical military subjects, a veritable gold mine is uncovered and it is the belief of the Committee that our membership will aid by keeping a watchful eye for any information of the above nation which might further the project. Due announcement of the Committee's procedure will be made in the next issue of this Journal.

A GOOD incentive to and a fitting reward for alert service by civilian employees of the Ordnance Department is provided now by law. The Secretary of War is authorized to offer a cash award for practical suggestions which will effect an economy in manufacturing processes. The amount of the award will not be fixed in advance, but will be determined by the value of the suggestion received. Awards will not be made until a suggestion has been adopted. Employees who are specifically charged with the duty of originating improvements and economy in manufacturing processes or plant will not be eligible for award.

WANTED: WORKABLE IDEAS

The law provides: "The Secretary of War is hereby authorized to offer periodically at such of the establishments of the Ordnance Department as he may select a cash reward for the suggestion, or series of suggestions, for an improvement or economy in manufacturing process or plant, submitted within the period by one or more employees of the establishment which shall be deemed the most valuable of those submitted and adopted for use; Provided, That to obtain this reward the winning suggestion must be one that will clearly effect a material economy in production or increase efficiency or enhance the quality of the product in comparison with its cost and in the opinion of the Secretary shall be so worthy as to entitle any employee making the same to receive the reward: Provided further, That the sums awarded to employees in accordance with this act shall be paid them in addition to their usual compensation and shall constitute part of the general or shop expense of the establishment: Provided further, That the total amount paid under the provisions of this act shall not exceed one thousand dollars for any one month: And provided further, That no employee shall be paid a reward under this act until he has properly executed an agreement to the effect that the use by the United States of the suggestion, or series of suggestions, made by him shall not form the basis of further claim of any nature upon the United States by him, his heirs, or assigns, and that application for patent has not been made for the invention."

MR. LLOYD GEORGE, in the latest volume of his "Memoirs", refers to General Pershing as a "narrow, stubborn man" who could see no further "than the exaltation of his own command, the jealous maintenance of his own authority". This reminds us of a fable that also emanates from England. The story goes that during the reign of the late Queen Victoria a rabble-rouser in Hyde Park was giving vent to a diatribe against Her Majesty. An American observer, somewhat shocked at the discourteous language, approached a bobby to inquire why such a barrage against the Queen was allowed. "Oh", said the bobby, "It 'elps 'im and he cawn't 'urt 'er."

PERSHING—*Summa Cum Laude*

The British War Minister also says some unkind things about American industrial effort during the World War. This, he refers to as a "fussy muddle". The equipment of the American Army he calls "a lamentable story of indecision and bustling incompetency". He says it was "one of the inexplicable paradoxes of history that the greatest machine-producing nation on earth failed to turn out the mechanisms of war after eighteen months of sweating, toiling and hustling".

Of course Mr. Lloyd George is again talking through his hat. But his bowler is so well riddled by his own explosive talk in recent years that our metaphor may be inaccurate. He once knew better than to make so sweeping a charge. We seem to remember cheering for him in Washington when he visited us after the war and we were enthralled by all the nice things he was saying about us in those days. We do not recall any unkind remarks he may have made then about our "narrow" military leader and our "paradoxical" industrial effort.

But this much is interesting. A politician turned sour (*e.g.* pacifist) knows no bounds. He loses perspective and goes to great length to gain a point. These gentry in our own country play the same game. Hasn't our immortal Woodrow Wilson been charged with "falsifying the record"? And now Pershing, according to the same kind of political source, was "narrow-minded, stubborn and vain"; our industrial effort "a fussy muddle". Again, we recall the words of Bobby Burns—"O wad some power the giftie gie us to see oursel's as ithers see us!"

As for General Pershing, universal approval has long since honored him for the fearless, capable soldier he is. His latest treatment at the hands of Mr. Lloyd George simply adds to the worth of all that has gone before. Formerly Pershing was our great general *cum laude,* now he is our *generalissimus summa cum laude.* As for our industry and its war effort, it too goes up a peg every time a politician unjustly excoriates it. The record cannot be changed now.

Left-Wing Munitions Phobia

An Editorial

NEWTON D. BAKER, our World War Secretary of War, in an eighty-six page article entitled "Why We Went to War", published in the current issue of *Foreign Affairs,* has performed another public service of the first magnitude. He has rendered such service on many occasions, but this latest is a work which, in years to come, will take its place among the foremost of his many great contributions to American security. His article is the result of a year's examination of the publications of our State Department, of the foreign offices of other governments, together with an examination of much that has been written on the subject by publicists and scholars. In 1936, twenty years after, he was led to the duty, with "as detached a state of mind as possible", because "it has become the fashion to suggest that our entry into the war was not in fact for the reasons then stated and generally accepted" (the sinking of merchant ships without warning and consequent loss of human lives).

Mr. Baker's principal attack is upon the disposition that has grown up in very recent years "to charge that bankers and munition makers asserted some sort of pressure upon the Government which affected its policy and ultimately led to our entering the war in 1917". He disposes of both charges absolutely and—we hope—finally. As to the alleged greed of the munitions industry these words of the great Secretary are conclusive: "A munitions industry large enough to be interested, much less influential, in our going to war simply did not exist . . . . . there was no munition industry in the United States in 1914 and by 1917, the industry in that field which had been created here, either by or on behalf of the Allied nations, was merely a part of America's industrial plant diverted from peace-time to war-time production, and the managers of those industrial undertakings could have had no interest in taking the country into the war. To have done so would have been the most short-sighted of policies, for after we went into the war, war profits were reduced to a minimum and excess-profits taxes squeezed the profits out of war with a wringer of constantly increasing efficiency. Upon the plainest terms, the interest of the owners of 'war babies' was in keeping our country at peace while they continued to supply the belligerents with their needs upon such terms as they could arrange." And on this score, he concludes (italics ours) *"The charge against munition makers seems to me largely an unsupported accusation made as an argument in furtherance of a policy by those who believe in the nationalization of all arms manufacture and the total prohibition of international traffic in arms."* We urge that every sincere student of the munitions problem in the United States study Mr. Baker's complete text, for it is factual, truthful, and conclusive. Moreover, there is no one person among us who has done more or who would do more for the cause of righteous peace than he.

With Mr. Baker's clarion refutation, the munitions issue now becomes clear. It is appropriate—indeed it is compulsory—to inquire into certain aspects of the blatant challenge made by "those who believe in the nationalization of all arms manufacture and the total prohibition of international traffic in arms," whom the former Secretary refutes. Surely the challenge is worthy of investigation because the challengers persist in their attack despite the truth. At once let it be said that the group of agitators of the challenge, unlike ancient Gaul, is divided into two parts: the first part comprises those who are sincere (those who believe whatever they are told); the second, the insincere (those who for various reasons—personal, political, financial, or subversive—persist in the attack). Among the latter the Left-wing organizations and individuals predominate. They are out to ruin all and sundry, to despoil reputations, to misrepresent facts, to bore from within and ultimately to destroy. The munitions hullabaloo is the Left at its best—the pity is that its disguise has been so cunningly devised that even a champion of Mr. Baker's integrity and experience is compelled twenty years after the war to present a factual case, quoting the words of the late Justice Holmes, "where the vindication of the obvious is sometimes more important than the elucidation of the obscure".

LIKE Mr. Baker, but far less qualified, we have watched the development of the Leftist technique in this challenge to Americanism and the national defense of the United States. We have observed the close alliance of the Left-wing so-called "peace" organizations with subversive forces, and we detect all the cunning influence of the Marxist. Pacifism, the subversive brand of it, is distinctly a vehicle for Leftist progress.

On this score, Mr. Herbert Wilton Stanley, a former member of the Socialist Party, and an authority on the radical movement in the United States, has put his finger directly upon the root of the Leftist munitions attack. Writing on "Red Pacifism" in the August, 1936, issue of the *American Mercury* he says: "In 1924, the Fifth Congress of the Communist International at Moscow adopted the new policy of the United Front for all official communist parties throughout the world, *including the United States* (italics ours). Briefly, this policy required that communists abandon their former sectarian attitude of total opposition to all other non-communist radical groups, and enter into United Front alliances with Socialists and Left-wing liberals to agitate specific issues. Two objectives have been accomplished by this strategy. First, a vast public has been brought into the orbit of communist influence by such Red championship of specific causes, a public which the Comrades hope eventually will be shepherded into the actual communist movement. Second, by disguising themselves as champions of civil liberties, or Negro rights, or immigrant welfare, or world peace, communist agitators have won an immunity from attack which they would not enjoy in open rôles. Thus, whenever a Hearst or a Chaillaux attacks a communist who at the moment may be doubling in brass as a functionary of the American League Against War and Fascism, the indignant Comrade can shriek 'Red-baiter' and appeal to a liberty-loving public to rally to his defense in this 'un-American' persecution of a foe of 'fascism'. It is a convenient device for turning defendant into prosecutor before the bar of muddled public thinking.

"The issue of pacifiism offered a particularly attractive opportunity for such United Front interpretation. The grotesqueness of communist zeal for peace in view of the bristling militarism of Soviet Russia did not occur to the humorless Marxian mind. Moreover, the achievement of pacifist aims in America coincided directly with revolutionary purposes. *It had long been a tenet of the Marxians that disarmament of the bourgeoisie is an antecedent step to successful proletarian revolution. Accordingly, by working with the religious and liberal pacifist elements for the reduction of armaments and the crippling of the American munitions industry, communists would be weakening the defenses of a system which it was their purpose eventually to attack.*" (Italics ours.)

HERE then is a disclosure of one real purpose of the munitions attack—it is a virulent misrepresentation along a planned procedure, the steps toward the goal being: (1) Agitation of alleged munitions evils by misrepresenting facts and misconstruing objectives; (2) Elimination of private manufacture by popular demand and the substitution of nationalized production in the hands of government; (3) The consequent disarmament of the individual and, finally, (4) The breakdown of all restraint by world revolution. Or, as Mr. Stanley expressed this last stage: "The Marxist seeks not peace but class war. He marches with pacifism, not to end war but to exploit pacifism for the launching of the most deadly internecine strife which has ever been suffered by mankind. To admit such incompatible allies into its ranks is to forfeit for pacifism the moral respect of the world. Without a resolute and realistic attitude on the part of the geniuine pacifist—an attitude which pacifism has not yet exhibited—there can be no checking of the present Red advance. Pacifism will become merely another party line for the resourceful schemers who have determined that American democratic government must perish."

By this evidence the munitions agitation is now revealed in its true light which is none other than that the munitions agitation is one of several entering wedges of the Left to destroy the national defense of the United States, to disarm the people and to pave the way for Marxian revolution. It is that and nothing less! Nationalization of arms means simply the disarmament of the people by denying the fundamental right of the people to keep and bear arms. A disarmed people means the unfettered sway of a group in power. Witness the Red technique in Spain at the moment!

Thus we come to some plain talk. Will the America people supinely follow the munitions hoax down the road to Communism or will they use the common sense with which they are generally accredited? Upon their answer rests a great part of the preservation of America against Communism. For this is the simple fact: the two effective enemies of Communism are organized religion and the military. Both stand like rocks for discipline, authority, justice, mercy, and truth. Both are the target of unrelenting Leftist attack. This war—make no mistake about it—has begun. It is the Communist war on religion and the military. When religion is attacked and destroyed (we make no distinction of sect) morality together with moral discipline is gone, and the pandemonium of Godlessness takes sway; when the military is attacked and destroyed (we include men and munitions) national security and national discipline are gone and the chaos of world revolution—Communism triumphant—has arrived. Let the Leftist agitator deny this if he will. The facts of the case turn the lie upon him.

IS the plea far fetched? We are certain it is not. Only a subversive influence could be so blatant, so cunning with its boring from within, to have the effrontery to stimulate class war among us by blaming arms producers for our entry into the World War. Mr. Baker writes: "When we began the actual mobilization of material for our participation in the World War there simply were no American munition makers. General Bliss went to England in January, 1918, and continued an agreement made in June, 1917, whereby the British and French supplied us with cannon out of their surpluses in exchange for raw materials. In the early months of the war our manufacture of guns was neglible . . . . For months American manufacturers were unable to make heavy ammunition . . . . We converted typewriter factories into fuze factories and generally converted American industrial plants to the war material nearest their normal product. Somehow we got through—in the opinion of the impatient, none too well. But a munitions industry large enough to be interested, much less influential, in our going to war simply did not exist. During 1916 I never saw a munition maker except as I sent for him and urged him to try to help us in the emergency of our border troubles."

In speaking plainly on the implications of this issue today a significant fact is that the private arms industry in the United States is in identically the same position in 1936 that it was during the period of which Mr. Baker has written. As in 1914, so today there is the very meagerest nucleus of actual arms producers to whom the United States in another emergency can look for its immediate needs. When the next emergency comes for us it will be a case of converting private industry to war-time production just as we were compelled to do in 1917. The one real improvement in the situation is that industrial mobilization planning is no longer an unknown quantity, and commendable steps are being taken in conformity with the National Defense Act of 1920 to see to it that the transition is less costly, less cumbersome and less inefficient. But an active private arms industry in addition to the inadequate facilities of Government-owned arsenals is our only stop-gap between mobilization and the period when a converted peace-time industry swings into its emergency job. As General Fuller so well points out in the leading article in this issue, the major wars of tomorrow may be decided so quickly that the early stages of modern war are crucial. These facts the Left-wing knows full well, and in its philosophy it will have achieved a great step toward the disarmament of the people and world revolution if it can dislodge not only the whole plan of industrial mobilization but particularly those industries which are at all equipped for arms production. Mr. Baker has revived the clarity of the issue of 1916 and with us it is the selfsame issue in 1936.

From this restatement of facts, of which all the intellectually underprivileged could be cognizant if they cared one whit for the truth, there is only one fair inference to be drawn. And we repeat it: The Left-wing munitions phobia is part and parcel of an undercover attack to weaken and ultimately annihilate the national defense of the United States. "Let him who wishes to be deceived be deceived."

Association Affairs

Election of Officers and Directors

THE biennial election of officers and three national directors of the Association was held in accordance with the provisions of the constitution on September 1, 1936. By practically unanimous choice Brig. Gen. Benedict Crowell was reëlected President and Cols. William W. Coleman and Frederick H. Payne, Vice-Presidents. These officers will serve for two years beginning January 1, 1937. Directors elected to serve four years, 1937-1940, are: Cols. Frank A. Scott, Robert P. Lamont and Charles L. Harrison.

The Committee of Tellers appointed to canvass the ballots consisted of Capt. D. N. Hauseman, Ord. Dept., chairman, and Messrs. William N. Roach and Fred Hawkes.

To recall for old friends and to acquaint new members with the sterling achievement of these elected officials who have served the Ordnance cause so faithfully for so many years, we publish the following short biographical sketches. With the exception of Colonel Payne, who is a new member of the official directorate of the Association, the others have been identified with it in an administrative capacity since the organzation was founded in 1919. Any society so fortunate in having gentlemen of their ability to guide its activities is privileged indeed. To them and their associates on the Board of Directors are due the unflagging interest and certain progress which industrial preparedness has attained through the Association since the World War.

BRIG. GEN. BENEDICT CROWELL, U. S. Army Reserve, of Cleveland, Ohio, was the Assistant Secretary of War and Director of Munitions from 1917 to 1920. He received his early education at St. Paul's School, Concord, N. H., and was graduated from Yale University with the degree of Ph.B. In 1918 the degree of M.A. was conferred upon him by his alma mater. For many years prominent as a mining engineer and in the building and construction industry, General Crowell's first service to the national defense was when he became associated in the work of steel production with the General Munitions Board in 1917. He was a member of the Kernan Board authorized under the first National Defense Act to conduct an investigation as to the "feasibility, desirability and practicability" of Government manufacture of arms, munitions, and equipment. Subsequently he was commissioned a major in the Reserve Corps and placed in charge of the Washington office of the Panama Canal, which position he resigned upon his appointment as the Assistant Secretary of War, November, 1917.

General Crowell's great record in charge of the engineering and munitions branches of our World War effort, including the provision of arms and munitions for our military forces, is one of the brightest pages of Amercan military success. The detailed account of this achievement is well known. It is reported with becoming modesty in some of his writings including "America's Munitions 1917-1918" (an official report submitted after the termination of the war) and in the six-volume work "How America Went to War" (in collaboration with Capt. Robert Forrest Wilson). He was commissioned a brigadier general in the Ordnance Reserve in 1931.

A director and past president of the National Rifle Association, he is also a member of the American Institute of Mining and Metallurgical Engineers, the Mining and Metallurgical Society of America, Lake Superior Mining Institute, Iron and Steel Institute, Canadian Mining Institute, Cleveland Historical Society, etc. He served as a member of the Ohio Coal Code Authority, and a director of the National Emergency Council for Ohio.

COL. WILLIAM W. COLEMAN of Milwaukee, Wis., is a native of Maryland. He was graduated from Lehigh University with the degree of B.S. in metallurgy and began the practice of his profession first with the Bethlehem Steel Company, later serving with the Crucible Steel Company and Latrobe Steel and Coupler Company. In 1905 he became associated with the Bucyrus Company, manufacturers of machinery; since 1911 he has served as president of that company and its successor, the Bucyrus-Erie Company of South Milwaukee. In 1918 Colonel Coleman was appointed a special assistant to the Chief of Ordnance, United States Army, in charge of the vast artillery production program. He was commissioned a colonel in the Ordnance Reserve. In addition to the vice-presidency of the Association, Colonel Coleman is also a trustee of Milwaukee Downer College, a director of the Columbia Hospital, and a member of the American Society of Mechanical Engineers, the American Institute of Mining and Metallurgical Engineers, Iron and Steel Institute (Great Britain), American Academy of Political and Social Science.

COL. FREDERICK H. PAYNE, Ord. Res., was the Assistant Secretary of War from 1930 to 1933. He fills the office of Vice-President of the Association formerly held by the late Col. William C. Spruance whose unexpired term was left vacant in tribute to his memory. Colonel Payne was born in Greenfield, Mass., and was educated in the public schools of that city. He became bank examiner for the state of Massachusetts in 1906. He was president of the Mechanics Trust Company, Boston, and later vice-president of the Federal Trust Company. From 1912 to 1930 he was successively treasurer, vice-president, president, and chairman of the board of Greenfield Tap and Die Corporation. During this period he was a partner of Tucker Anthony and Company, investment bankers of New York and Boston.

He was commissioned a major in the Ordnance Department of the Army in 1918, serving as procurement officer of the Bridgeport Ordnance District. Following the war, he was a member of the Bridgeport District Claims Board. In the postwar Ordnance District organization he became assistant chief of the Bridgeport District, serving continuously from 1919 to 1930, and he again resumed these duties at the termination of his service as the Assistant Secretary of War in 1933.

COL. FRANK A. SCOTT of Cleveland, Ohio, was the first chairman of the General Munitions Board and of the War Industries Board in 1917. His early education was in his native city and under the tutelage of John H. Dynes of Western Reserve University, which institution awarded him the degree LL.D. in 1926. His first business connection was as assistant secretary and secretary of the Cleveland Chamber of Commerce and later secretary and treasurer of Superior Savings and Trust Company. In 1908 he became associated with Warner and Swasey Company, manufacturers of precision instruments, occupying the offices successively, from 1909 to 1927, of secretary and treasurer, vice-president, president, president and chairman of the Board.

Colonel Scott, at the request of the Secretary of War, undertook the arduous task of mobilizing American industry for war service in 1917. These duties were so great that failing health compelled his retirement as chairman of the War Industries Board in 1917. In 1919 he was awarded the Distinguished Service Medal for Meritorious Service. Commis-

sioned colonel in the Ordnance Reserve, he served as chief of the Cleveland Ordnance District from 1924 to 1928 and in 1925 was appointed honorary adviser to the Army Industrial College.

COL. ROBERT P. LAMONT of New York, former Secretary of Commerce of the United States, was chief of the Procurement Division, Office of the Chief of Ordnance, during the World War. Born at Detroit, he was graduated from the University of Michigan, B.S. in civil engineering, his first professional undertaking being with the Chicago Exposition. Later he served as an officer of the Simplex Railway Appliance Company, American Steel Foundries and Griffin Wheel Company. He was president of American Iron and Steel Institute, 1932-1933.

Commissioned a major in the Ordnance Department of the Army, February 1918, Colonel Lamont administered the huge procurement program of the Ordnance Department at Washington. He returned to civil life in February, 1919, and was chairman of the American Section, Interallied American High Commission. He established the Astronomical Observatory of University of Michigan in South Africa.

COL. CHARLES L. HARRISON, chief of the Cincinnati Ordnance District, is a native of Cincinnati, Ohio. He has been identified with the Ordnance District organization since 1918, having served continuously as chief of the Cincinnati District since that time. A graduate of Harvard University, he is a former president of the board of sinking fund trustees of the City of Cincinnati and an official of a number of manufacturing, railroad and financial organizations.

When the Ordnance district system was established under the direction of the late Brig. Gen. Guy E. Tripp, Colonel Harrison was chosen head of the area including the states of Alabama, Florida, Georgia, South Indiana, Kentucky, Louisiana, Southern Ohio, Mississippi, and Tennessee. His principal task in this undertaking was the coördination not only of ordnance products in this area but particularly of machine-tool facilities to meet the armament program. Following the Armistice, Colonel Harrison served as chairman of the District Claims Board charged with settling all claims against the Government arising from contracts for the manufacture of ordnance within the district. For some time he served as president of the Cincinnati Post of the Association.

THE above brief sketches of our newly elected officials will serve to emphasize the quality of leadership the civilian ordnance cause enjoys in the United States. The members of our Association having again attested their complete approval and high regard for the officers and their work, will join in this meager acknowledgment of their great public service and of their high loyalty to the national defense.

In addition to the above officials the other national directors of the Association whose terms of office continue until 1939 are: Maj. Gen. C. C. Williams of South Hamilton, Mass.; Brig. Gen. Samuel McRoberts of New York, N. Y.; and Col. LeRoy Hodges of Richmond, Va. Other directors representing local posts of the Association are: Col. Bruce Cornwall, San Francisco, Calif.; Col. Harry Scullin, St. Louis, Mo.; Col. Charles H. Tenney, Springfield, Mass.; Col. James L. Walsh, New York, N. Y.; Mr. E. A. Muller, Cincinnati, Ohio; and Col. John S. Sewell, Birmingham, Ala. To all these gentlemen the Army Ordnance Association is greatly indebted for their active interest and coöperation.

NEW MEMBERS

THE following have recently been admitted to membership in the Army Ordnance Association: Horace J. Alter, Brooklyn, N. Y.; Joseph G. Armstrong, New York, N. Y.; William M. Armstrong, Buffalo, N. Y.; Henry C. Ashley, Waterbury, Conn.; R. M. Bartlett, Pittsburgh, Pa.; Clarence P. Beals, North Kansas City, Mo.; A. J. Bessolo, Pittsburgh, Pa.; Edwin E. Burroughs, Queens, N. Y.; J. B. Carlock, Pittsburgh, Pa.; John Chrosniak, Chattanooga, Tenn.; Ernest E. Clark, Brooklyn, N. Y.; Erick G. Colson, Great Neck, L. I., N. Y.; H. W. Cotton, Jamaica, N. Y.; Uriel S. Davis, Dunsmuir, Calif.; A. V. deForest, Cambridge, Mass.; Carl de Ganahl, Bristol, Pa.; A. N. Dugan, New York, N. Y.; Allen J. Frick, Brooklyn, N. Y.; F. A. Frick, Queens Village, N. Y.; Paul H. Frick, Narberth, Pa.; Jerome A. Fried, Ithaca, N. Y.; Arthur H. Gaebel, Larchmont, N. Y.; J. P. Gallagher, Wellston, Ohio; H. J. Geitz, Collingswood, N. J.; Robert F. Gibson, New York, N. Y.; Frederick C. Gladeck, Brooklyn, N. Y.; Palmer L. Hahn, Milford, Del.; Elbert A. Hanauer, Hollis, N. Y.; C. L. Harrell, St. Louis, Mo.; Charles A. Hescheles, Jamaica, N. Y.; Henry E. Hill, Livingston, N. J.; Edward Hultberg, Jr., Mt. Vernon, N. Y.; Erik W. Jordahn, Ashland, Ky.; Melville W. Kantrow, New York, N. Y.; Louis J. Klaus, Farmingdale, L. I., N. Y.; F. R. Krause, Albuquerque, N. Mex.; Franklin V. Lanum, Evanston, Ill.; Carl F. Larsen, Wilkinsburg, Pa.; Fairman B. Lee, Seattle, Wash.; John A. Lindstrom, Brooklyn, N. Y.; Hjalmar T. Lundquist, Kennett Square, Pa.; Wesley E. McArdell, Stapleton, N. Y.; Ralph J. Mercer, New York, N. Y.; C. W. Middleton, New York, N. Y.; Leroy R. Miser, Hackensack, N. J.; Jay A. Mount, Washington, D. C.; Stanley Munson, Hollis, N. Y.; J. C. Murray, Pittsburgh, Pa.; George D. Mylchreest, Bethlehem, Pa.; Walter G. Paul, Hackensack, N. J.; Guy V. Pollard, Detroit, Mich.; Harley L. Potter, Castile, N. Y.; Clay Preston, Silver City, N. Mex.; James R. Randolph, Kingston, R. I.; Barron P. Rex, Geneva, N. Y.; Russell G. Rodman, Cherokee, Iowa; Kenneth C. Rorvig, Brooklyn, N. Y.; Theodore F. Schmidt, Salem, Ore.; Orville H. Schwanger, Middletown, Pa.; J. R. Shoffner, Timblin, Pa.; William H. Simmons, Champaign, Ill.; Park T. Sowden, Canajoharie, N. Y.; E. C. Swain, Waltham, Mass.; Howard C. Van Auken, Bloomfield, N. J.; H. G. Williams, Chicago, Ill.; Richard R. Wiss, South Orange, N. J.; and James W. Wylie, Malverne, L. I., N. Y.

NECROLOGY

NOTICE has been received of the death of the following members of the Association: Joseph Bancroft, Wilmington, Del.; Alex. K. Hamilton, Chicago, Ill.; William Hoeler, Flushing, L. I., N. Y.; H. L. Horning, Waukesha, Wis.; Frank S. Hyatt, Brooklyn, N. Y.; and John A. Root, Berkeley, Calif. To their relatives and friends, ARMY ORDNANCE, on behalf of the Association membership, extends condolences.

LIEUT. COL. ALEX. K. HAMILTON

LIEUT. COL. ALEX. K. HAMILTON, former president of the Chicago Post of the Association, died September 8, 1936. In his passing away the National Association and particularly the Chicago Post suffer a severe loss.

Colonel Hamilton was graduated from the Stevens Institute of Technology and spent his entire professional life in the steel industry. In recent years he was president of the M. H. Treadwell Company of Illinois.

During the World War Colonel Hamilton served with distinction as the Pittsburgh District manager for the Army Air Service. After the war he was the Air Service district manager for Chicago where he was in charge of the settlement of all claims. In 1923 he was appointed manager in the Ordnance Reserve Corps, subsequently being promoted to the grade of lieutenant colonel. As a director of the Chicago Post he was very active in ordnance affairs and could always be counted upon for enthusiastic help. His many friends and associates will feel keenly the loss of his sterling character.

Ordnance Field Service

ARMY ORDNANCE SERVICE, PART I

By LIEUT. COL. RAYMOND MARSH, *Ord. Dept., U. S. Army**

THE basis of Ordnance service with mobile field forces may be found in the general functions of the Ordnance Department and the duties of unit Ordnance officers. By law and regulation the Ordnance Department is, in general terms, charged with "the provision and distribution, and maintenance and repair of certain prescribed articles, including, generally, all arms, armament, ammunition, tanks, special Ordnance vehicles, bombs, and other equipment and supplies" for whose procurement, storage and issue the department is responsible. The duties of a unit Ordnance officer are set forth in the current edition of the Staff Officers' Field Manual, as follows:

1. Command, insofar as relates to operations, of Ordnance troops not assigned or attached to subordinate units. 2. Adviser to the commander and the staff in Ordnance matters. 3. Supply of ammunition (as far forward as the refilling points) and other Ordnance equipment and supplies. 4. Operation of Ordnance storage, maintenance, and repair facilities, including salvage and repair of Ordnance matériel. 5. Technical inspection of Ordnance equipment. 6. Supervision, within limits prescribed by his commander, of Ordnance activities in subordinate units. 7. The collection of information concerning Ordnance matériel.

Translated into functions, the foregoing enumeration of duties and responsibilities means that Ordnance service performs the following duties with mobile field forces:

1. The supply and distribution of Ordnance matériel, except artillery ammunition, to all units in the theater of operations, down to and including the regiment, or corresponding independent unit. 2. The supply and distribution of artillery ammunition down to and including refilling points. 3. The repair of Ordnance matériel in all echelons when such work is beyond the capacities and capabilities of the facilities and personnel available in the units themselves. 4. The gathering of technical information concerning the proper use and defects of our own matériel, and also any new developments or improvements of enemy matériel. 5. The custody of captured enemy ordnance.

In addition to supplying technical information and advice, the foregoing duties and missions may be summarized under two heads: namely, supply and maintenance. However, on account of the hazardous nature and the vital importance of ammunition, ammunition supply has been set up in a separate category. Therefore, there are, in general, three main tasks to accomplish: general supply, ammunition supply, and maintenance.

Army Ordnance service is headed by the army Ordnance officer, who is responsible for the following: The timely provision for Ordnance requirements of the army in accordance with the tactical plans of the army commander; Recommendations upon which the Ordnance section of the army supply plan is based; The execution of the army supply plan insofar as Ordnance is concerned, including the command of Ordnance troops and installations in the army area not assigned or attached to subordinate commanders; The establishment of the necessary depots to carry out the Ordnance supply plan in order to place Ordnance supplies within practical haul of front-line divisions and corps; The operation of these army Ordnance depots as separate establishments under his direct control.

*This discussion presents the personal views of the author and does not represent official policy on the subject.

An analysis of these responsibilities shows that the army Ordnance officer has two distinct functions—planning and operation. Both must be performed simultaneously. While one plan is being carried out, others must be in the process of preparation, with particular reference to the contemplated tactical and military employment of the army and its component elements. The size of the task renders it usually impossible for the army Ordnance officer both to plan and to execute. His primary rôle, normally, should be that of the planner. He still bears the responsibility for the execution of these plans, but the actual execution of the plans should be delegated to subordinates, and the efficiency and effectiveness of this delegated execution should be determined and enforced by inspections. These inspections not only enable the Ordnance officer to supervise and insure the execution of his plans, but they provide valuable information on which he may base his future plans.

LET us consider first the nature of the plans and some of the basic facts which must be taken into consideration in the formulation of these plans; for example, the basic data pertaining to the organization, armament, and equipment of the army. This leads to a consideration of the type of matériel which the army will employ, the nature of its ammunition supply, and consequently an estimate as to the requirements for ammunition supply and general supply. Consideration must be given to the status of supplies which may be made available to the army Ordnance officer, what is the nature of these supplies, what is their extent, where they are located, how he may procure them, whether credits have been set up or whether requisitions must be employed. It is essential to know the number and location of the supply establishments from which he will draw his supplies. This involves also a thorough knowledge as to the rail and road-net and the system of transportation or traffic control which will be applied. In addition to this basic data, careful consideration must be given to the plans of the commanding officer and the tentative plans of other supply services. The Ordnance supply plan must be based upon the plan for the tactical employment of the command. Consequently, the administrative decisions of the commander or his G-4, together with administrative orders, plans, or policies of higher echelons, must be known. Since the success of the army supply plan depends upon a thorough knowledge of the contemplated tactical employment of the army, it is needless to say that the army Ordnance officer must be familiar with the combat orders of the army and must indulge in the freest liaison with the Army G-3.

In carrying out the approved Ordnance plan, in addition to the supervision in the form of inspections of the establishments and personnel which execute this army Ordnance plan, there are certain other things which the army Ordnance officer and the personnel of his office must perform. These include: Action on requisitions for Ordnance supplies submitted from lower echelons; The regular and frequent consolidation of ammunition expenditure reports and ammunition depot stocks; The submission of calls or requisitions for supplies from the communications zone, in accordance with the approved Ordnance supply plan for the theater of operations; The continuous compilation and the keeping up to date of the several items of basic data referred to previously.

We may now consider the organization of Ordnance service in the army area and the troops, facilities, etc. available for the accomplishment of its mission. As a part of army headquarters there is an Ordnance Section consisting of fifteen officers and thirty-nine enlisted men. This organization is known as an army Ordnance headquarters company, and previously was considered as a separate organization. However, in a communication dated January 10, 1931, the War Department ruled that "the army Ordnance headquarters will be mobilized as part of the headquarters of a field army," and that in future revisions of the tables of organization, this headquarters group would be shown

as a part of army headquarters. No prescribed organization is laid down for this unit. In general, however, such army Ordnance headquarters will be organized into an administrative division and an operating division. The administrative division might properly include such sections as mail and record, personnel, statistics, and publications and regulations. The operating division might be called the supply division, because it would operate to insure adequate supply of Ordnance matériel and services. Such a division should include an ammunition section, divided into such groups as may be necessary; a general supply section, likewise divided into such groups as may be necessary; and a maintenance section which would perform such inspection services and the operation of such maintenance facilities as may be required or available to the army Ordnance officer.

In the type organization for a field army, in addition to this army Ordnance headquarters, which as I have said, is a part of the army headquarters, there is an army service group known as the army Ordnance service. This includes three Ordnance ammunition companies, one Ordnance maintenance company of medium characteristics, and three Ordnance depot companies. It is the function of the ammunition companies to provide the administrative and supervisory personnel for army ammunition depots. The primary function of the maintenance company is the operation of a small-arms repair center. The Ordnance depot companies operate such Ordnance general supply depots as may be established in the army area.

CONSIDERING now the matter of general supply, let us see how the initial stockage of army depots, the issue to troops, and the replenishment of stocks is accomplished. At the risk of repetition, let me remind you, as has been brought out in previous discussions, that Ordnance activities may be generally grouped into two classifications: namely, provision and distribution. Ordnance service, likewise, may be divided into these same two general classifications. Ordnance service must supply items of Ordnance matériel. In obtaining these items, there first must be set up somewhere a requirement as to items and quantities, and then these requirements must be procured or supplied. Once the items are made available, their distribution must be effected in order to accomplish military supply. This distribution consists of the phases of reception, classification, storage, and issue. Requirements in the army are based on maintenance demands and the estimated consumption of future or projected military operations. The requirements based on these two major factors are procured from the communications zone as a result of either requisitions or drafts against established credits. Reception of these supplies is effected at army installations, being routed thereto through the regulating stations. These army installations are army depots—generally branch depots. In the army area, classification is by service and in the Ordnance depots Ordnance property will first be classified as pertaining to Class III or Class IV supplies, and will further be classified for convenience in storage into the well-known system of lettered groups of Ordnance property classification. Storage is effected in the same installations where they are received. Issues are made direct to army troops, to divisions, and to corps troops.

If an Ordnance officer could always fall heir to a well-organized army, concentrated at its proper place and engaged in military operations the future of which had been carefully thought out, with supply establishments set up, the operation of the Ordnance supply plan would be a comparatively simple matter and would involve but little more than the replacement of issues with such variations as contemplated operations might indicate. However, such a situation is seldom the case. Army operations usually involve first a concentration, and then combat. Consequently, supply systems must first be established and then operated. It is in the establishment of the supply plants where by far the greatest amount of work and planning are involved.

The first task, then, that confronts the army Ordnance officer is the determination of the initial stocks of his general supply depots. The administrative order of either the army or higher echelon will generally prescribe the general policy of how many days of supply will be kept in depots. Thus, an army Ordnance officer may receive instructions to the effect that he will maintain his depot stocks at so many days' level of supply. The problem, then, is one of interpreting so many days' level of stocks into specific items and quantities of each item.

One of the basic facts which the army Ordnance officer must consider in the preparation of his Ordnance plan of supply is the armament and equipment of his army. With this as a starting point, he must determine how many of these items and what component parts, etc., are necessary to maintain in active service, during the period indicated, the number of these major items pertaining to the army's equipment. There is no royal road to a quick determination of these items and their quantites initially. Our SNL's give data as to the number of parts necessary for the maintenance of major items for periods indicated in the SNL's. However, the number of major items on which this list of required parts is based, differs for different items. But it is possible to determine a factor which may be applied to the number of each major item of Ordnance equipment in the different units of the army, and by tabulating these numbers of major items the computation of the requirements for spare parts, etc. may be simplified. This process takes care of the small replacement items or parts.

In addition, however, army depots must be prepared to issue major items such as tanks, tractors, artillery matériel, fire-control instruments, etc., to replace those damaged in action beyond the capacity of repair by any maintenance facility within the army. The army Ordnance officer must prepare a list of all of these major items and determine and establish the number of each item with which the army depot is to be stocked. This is largely a matter of judgment, and will depend to a considerable degree on the character of the operations. Maintenance factors determined on the basis of the best experience in past wars may be used as a guide.

Similarly, the quantities of standard hardware, cleaning and preserving materials, oils, greases, etc., may be determined either from SNL's tables of basic allowances, or from actual experience.

The Ordnance officer is primarily interested in items and quantities. The transportation service which will deliver these supplies is interested in weights and cubical contents. Therefore, this list of supplies, component parts, major items, etc., must be translated into terms of tons, carloads, etc. This translation may be easily effected by using tables and other information pamphlets put out by the Ordnance Department. This determination of the tonnage of supplies is absolutely necessary in order to plan for the shipments, make the necessary arrangements for handling and unloading supplies, provide the personnel needed to establish and operate the depot or depots, and to obtain the space and buildings necessary to house the supplies, or to plan the construction of such necessary buildings.

WHILE this laborious and voluminous calculation as to the stockage of the depot is being performed, consideration must be given to a number of other questions of equal, or perhaps greater importance; such as, for example, the number of depots to be established and their location, a consideration of available locations and their existing facilities, the additional facilities which must be procured, the assignment of personnel for the operation of the depot, the determination of additional personnel and other assistance required in the establishment of the depot, the time schedule at which the supply trains should arrive, the time when the depot should open, the organizations to be supplied from each depot in case more than one is established, and the method of issue and the means of replenishment. (*To be continued.*)

Professional Notes

Ordnance Training at Michigan

By Lieut. Theodore R. Wieseman, *Ord. Res.*

THE Ordnance Reserve Officers' Training Camp held at the University of Michigan, Ann Arbor, Michigan, from August 2 to August 15, 1936, maintained, and perhaps even surpassed, the fine record established there by previous camps.

One purpose of the camp was, as Col. Alfred H. White, Ord. Res., the commanding officer, put it, to give the student officers attending an intensive training which would increase their usefulness in an emergency as well as be of practical value in civilian life. The student officers who attended can vouch for the happy way in which the objective was attained.

Since many young officers are unfamiliar with the routine and curriculum of such camps, it should be of interest to discuss the schedule in more detail than might otherwise be justified.

Theoretically, the machining of a shell or a fuze part differs little from other machining operations, so no unusual dearth of operators or inspectors in emergency is anticipated. Similarly, there are many manufacturers and chemists who are well informed on explosive manufacture, so the basic technical skill needed in that field is expected to be available. However, except at arsenals, practically no loading is done in peace time, with the result that relatively few officers become familiar with even the most elementary fundamentals of loading. For this reason the schedule of classes was planned to acquaint a number of officers with the essentials of loading-plant operation and layout, in the hope that such training would stimulate further interest and study on the part of the student officers.

The details of handling personnel as worked out by Maj. R. E. Hardy, Ord. Dept., the adjutant and executive officer, were remarkably efficient, eliminating the necessity for any officer wondering where he was to sleep, how much food would cost, or what was expected of him. In fact, practically every reasonable question had been anticipated and the answer supplied even before the question was asked. This was accomplished by sending each officer ordered to the camp a mimeographed memorandum as soon as his orders were published. This memorandum outlined the schedule, time and place of reporting, information on quarters and mess, the required uniform, and other pertinent information.

On reporting for duty, each officer was given an additional memorandum containing complete information as to the location of quarters, mess, and all the other necessary data. A map of the campus, showing location of class rooms and quarters, to assist in orientation, was included. Each officer was interviewed by Colonel White for discussion of the particular student officer's qualifications and permanent assignment. These data were used as a basis for assignment to classes, as all officers did not take the same courses throughout. Physical examination was conducted immediately by Maj. Carleton Pierce, Med. Res., the camp surgeon. Under his care, the health of the group was excellent. Based on their previous training and assignment, officers were assigned to courses in elementary or advanced metallurgy, or explosives. Certain other courses were required for all officers.

A typical day's schedule follows: 6:30 to 6:50, A. M.—Calisthenics, directed by Major Hardy; 7:15—Breakfast; 8:10 to 9:00—Class in Loading Operations, by Capt. Charles B. Gordy, Spec. Res.; 9:10 to 10:00—Inspection and gaging of metal components, Maj. F. A. Mickle, Ord. Res. and Mr. L. N. Dwyer; 10:10 to 11:00—Procurement and Contracts, by Maj. John S. Worley, Spec. Res. (The above classes were participated in by all officers.); 11:10 to 12:00—Elementary Metallurgy, Advanced Metallurgy, or Explosives, according to assignment; 12:15 P. M.—Lunch; 1:30 to 3:30—Laboratory work in gaging, and conferences on special problems, directed by Colonel White; 6:00—Dinner.

Lieut. Col. A. B. Quinton, Jr., Ord. Dept., Executive Officer of the Detroit District Ordnance Office, spent part of two days discussing Industrial Mobilization.

Colonel White's kindly consideration is well illustrated by the fact that he gave the student officers a smoker at the Michigan Union Club on Tuesday, August 5th, thus eliminating the necessity of the officers making an official call. The student officers reciprocated with a dinner complimentary to Colonel White and the faculty on Wednesday, August 13th.

The loading operations course offered by Captain Gordy covered plant layout, safety features, handling components and explosives, and assembly. Moving pictures showing methods employed at Picatinny Arsenal added additional interest to the course, and gave the student officers an excellent idea of the problems and their solution.

GAGES are vital to interchangeable manufacture so a thorough knowledge of the design, methods of use, and methods of verifying and checking gages is essential. Further, such knowledge puts the Army inspector in a better position to discuss gaging problems with the contractor and will preclude the possibility of many difficulties arising, for shop men are always more coöperative with a man who knows his business than with one who is uninformed. The Ordnance Department therefore arranged for Mr. L. N. Dwyer, of the Gage Laboratory of Watervliet Arsenal to give a course in gages, their use, and methods of checking. The new gage laboratory of the Detroit Ordnance District, under the supervision of the University of Michigan, was used to the fullest extent and proved a great aid. This laboratory is fully equipped with all of the latest and most accurate gaging and measuring devices. Included are optical flats, a measuring machine measuring direct to one-one hundred thousandth of an inch (.00001) any length up to 48 inches, a supermicrometer, Johanson and Hoke precision blocks, toolmakers' microscope, and many others. The course offered by Mr. Dwyer was very thorough and of direct practical value in civilian pursuits to a majority of the group. Both lecture and laboratory work in actually handling and checking the gages was included.

Maj. Mickle presented the course on the duties of the Army inspector of ordnance. This course evoked great interest as evidenced by the discussions raised by the student officers. Major Mickle also assisted Mr. Dwyer in the laboratory work in gaging.

The course in Procument and Contracts, given by Major Worley, Spec. Res., was universally interesting and was of civilian as well as military value. Major Worley's discussion not only covered legal principles, but the origin and application of those principles. He stressed the duty the student officer owed the civilian as well as the Government and emphasized the need for greater social consciousness and leadership by the Reserve Officer.

The courses in elementary metallurgy given by Colonel White covered up-to-the-minute theory and developments. Many of the student officers had studied metallurgy during their university days but had forgotten much, so Colonel White's course acted to refresh the memory as well as to bring outmoded theory up to date. The advanced metallurgy course was handled by Maj. Clair Upthegrove, and ran into those intricacies of metallurgy which could be advantageously absorbed only by those who touched the field in civil life. The explosives course, given by Maj. J. C. Brier, Spec. Res., covered explosives, their characteristics, methods of handling and loading. This course was open to those with special training.

The regents and faculty of the University of Michigan deserve much credit and thanks for allowing the use of classroom and laboratory facilities.

The student officers were widely diversified both as to civil vocation and geographical dispersion. The Reservists included lawyers, naval architects, chemists, metallurgists, and a director of industrial relations. Geographically, Oklahoma, Alabama, Pennsylvania, New York, Wisconsin, Georgia, Ohio, Michigan, Missouri, Indiana and Illinois were represented.

The training was intensive, varied, and practical, and it is believed that every officer connected with the camp, faculty members as well as students, is better fitted for his assignment and has had his interest in Ordnance responsibility greatly stimulated as a consequence.

HEAT TREATMENT IN TECHNICAL HIGH SCHOOLS

A COURSE unique among the high schools of the country is being given at the Brooklyn Technical High School, Brooklyn, New York, where a modern laboratory and up-to-date equipment are being used to give a comprehensive training in the fundamentals of Heat Treatment of Metals, under the direction of Mr. Wesley E. McArdell. Besides fitting young men to take important and responsible research positions in many industries, this course is building up an invaluable reserve of competent technicians, ready in time of emergency to take their place in a national defense program. This is industrial preparedness at its best.

Heat Treatment is now a required part of the Mechanical Course at the Brooklyn Technical High School and is taken up in the first half of the fourth year.

Instruction is given in such phases of the subject as selection, preparation and microscopical inspection of the several types of irons, steels, and nonferrous alloys commonly met with in industry. The photomicrographic camera is used in permanently recording the various structures disclosed under the microscope. Instruction is also given in case-hardening, the production of definite physical properties as specified, and the manipulation of various hardness-testing and temperature-indicating devices. X-ray apparatus is used to determine the soundness of welds, the homogeneity of castings and the inspection of normally closed assemblies. Adjacent to the laboratory is a dark room equipped to do all types of developing work.

With such a course annually turning out numbers of young men trained in metallurgy and with such equipment providing so adequate a means of instruction and future research, industry need not fear a shortage of technicians to handle its heat-treatment problems in peace and in war. Adoption of a heat-treatment course by all our technical high schools would add greatly to the industrial (and as a corollary, to the security) potential of the country.

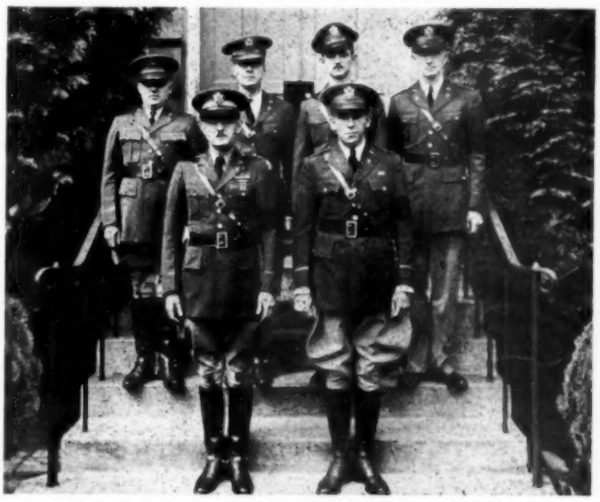
ESPRIT IN AN ORDNANCE COMPANY

AN event of more than passing interest to members of the Ordnance Reserve Corps was the "Company Day" and special dinner held by the 3rd Ordance Company at Fort Lewis, Wash., on August 29, 1936. The occasion was the change in command of the company from Maj. S. P. Meek, transferred to San Francisco, to Capt. Ward E. Becker, recently assigned from Picatinny Arsenal.

Through the kindness of the Service Battery, 10th Field Artillery, all members of the 3rd Ordnance Company were relieved from mess duties on that date, and as a result, all members of the command, except a few on furlough and detached service, were present. In addition, four of the five Reserve officers assigned to the company were present on inactive duty at their own expense, traveling a total distance of over 1000 miles to take part. The fifth officer in the company had recently moved to San Diego and was forced to be present "by letter" only.

The company Reserve officers conducted the weekly inspection and drill and went through the company orders and work order files to bring themselves abreast of the latest company activities. At 1:00 P. M. the officers and men assembled in the mess hall with Lieut. Col. A. W. Ford and Maj. W. H. Joiner of the Ordnance Department, as guests.

Following dinner, short talks were made by Lieut. Fred Breuchert, Ord. Res., Staff Sgt. E. S. Jenne and Pvt. 1 cl. R. S. Montgomery; 1st Sgt. L. T. Goyette was toastmaster. Major Meek gave a short talk, expressing his regret at leaving the command and with the company standing at salute, presented the company guidon to his successor. Captain Becker responded briefly and an individual goodbye from each member of the command to Major Meek and to Lieutenant Colonel Ford, who was relieved as Ordnance officer several months earlier and was about to sail for Hawaii, completed the ceremonies.



OFFICERS OF THE 3RD ORDNANCE COMPANY, FORT LEWIS, WASHINGTON

Front row (left to right): Maj. S. P. Meek, Ord. Dept.; Capt. Ward E. Becker, Ord. Dept. *Rear row:* 1st Lieut. Fred Bruechert, Ord. Res.; 2nd Lieut. G. H. Fernald, Jr., Ord. Res.; 2nd Lieut. E. L. Christian, Ord. Res.; 2nd Lieut. G. N. Michel, Ord. Res.

The whole affair was an excellent example of the high morale existing in the company, an *esprit de corps* which includes the Reserve officers assigned as integral parts of the command. The Reserve officers assigned to the company are: 1st Lieut. Fred Bruechert, Portland, Ore.; 1st Lieut. H. R. MacDonald, San Diego, Calif.; 2nd Lieut. Gordon H. Fernald, Jr., Portland, Ore.; 2nd Lieut. E. L. Christian, Seattle, Wash.; and 2nd Lieut. Glen N. Michel, Tacoma, Wash.

SYMBOLS OF CHEMICAL AGENTS

MOST chemical agents carry symbols that are readily recognized by anyone familiar with the proper names of the substances themselves. There is no difficulty in associating CN with chloracetophenone; DM readily suggests diphenylamine-chlorarsine. Such symbols impose no strain on the memory.

But much less obvious is the appropriateness of CG, PS, and HS. It is necessary now to dig back into history to learn why these particular symbols should have been assigned to the compounds they serve to designate.

Phosgene was manufactured by the French prior to the World War in a factory located in the town of Cologne. This plant was enlarged, once the Allies became aware of the mili-

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tary potentialities of phosgene, and its product came to be known by the French as "collongite," which identified without disclosing the real name of the agent. To the British, the substitution of CG must have appeared both fitting and convenient.

Chlorpicrin was well known as a chemical compound before the World War. The British investigations which led to the adoption of this substance as a chemical agent were conducted at Port Sunshine. The name of this town supplied the initials that served to identify chlorpicrin once it was introduced in battle. The symbol has stuck, and students have stumbled over it for years.

For both phosgene and chlorpicrin the symbols, therefore, served initially as ciphers or "short titles" which were intended to disguise the true nature of these agents. But the symbol for mustard gas came into existence for other reasons.

According to General Foulkes, a British authority on the subject, HS is derived from the initials of "hun stuff", a term popular with British soldiers shortly after mustard gas made its first appearance on the battlefield in 1917. Another and less opprobrious phrase that may have supplied the same initials is "hot stuff." At least the letter "s" can probably be traced to "stuff", obviously an Anglicized version of the word "stoff", which was associated with so many war gases of German origin.—*Chemical Warfare Bulletin.*

Air Corps Activities

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A new fire truck designed especially for extinguishing gasoline, oil, and electrical fires has recently been put into service at Scott Field, Ill. The 2½-ton American La France apparatus has ten wheels to afford traction on muddy ground. Each of its three hose lines is coiled on a reel and connected to its particular fire-fighting agent—water, carbon dioxide or foamite. The 500-gallon water tank makes the truck almost independent of a source of water suply. The foamite is used in combating oil or gasoline fires—550 pounds of foamite powder and a generator being carried on the truck. The carbon dioxide, used in electrical fires, is stored in liquid form in four 50-pound tanks under high pressure.

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AOA

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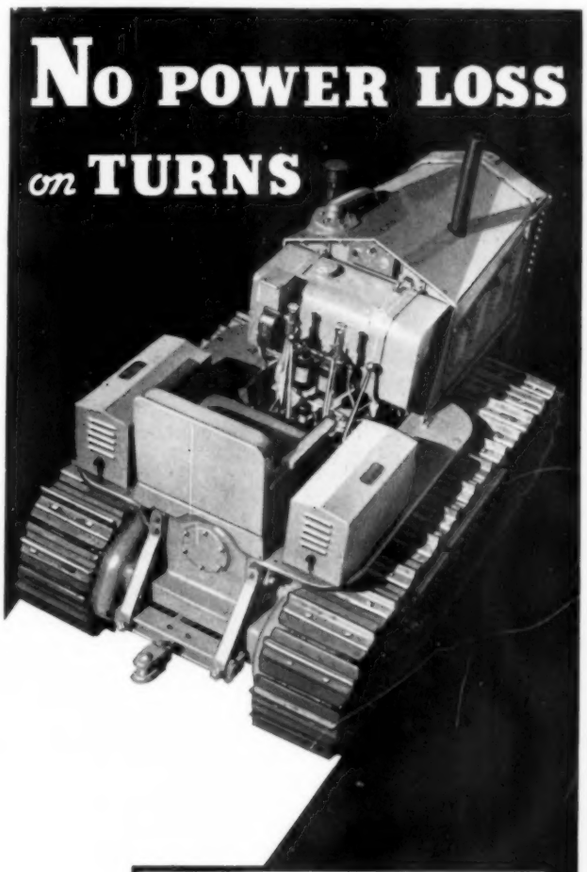

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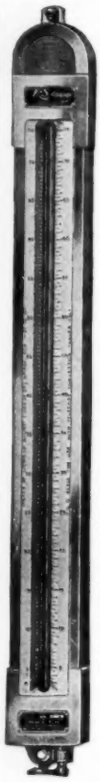

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REPRESENTATIVE JOHN J. McSWAIN, chairman of the House Committee on Military Affairs, who died at the Veterans' Hospital in Charlotte, S. C., following a heart attack, had been a member of the Committee ever since his entrance into the House in 1920, and became its chairman in 1930. An honorary colonel of the 263rd Coast Artillery Regiment of the South Carolina National Guard, Mr. McSwain took an active interest in military affairs during his whole legislative career. Although 42 years old at the time of the World War, he enlisted and after receiving his commission as captain in the First Officers' Training Camp, was assigned to the 154th Infantry and saw service in France.

The Antiaircraft Trophy, awarded annually by the Daughters of the American Revolution to the ships having the highest combined merit in antiaircraft firings, was won, in the 1935-1936 competition, by the U.S.S. MISSISSIPPI, commanded by Capt. W. P. Caddis, in the battleship class; by the U.S.S. INDIANAPOLIS, commanded by Capt. H. K. Hewitt, in the heavy cruiser class; and by the U.S.S. MILWAUKEE in the light cruiser class. The MILWAUKEE was commanded during the past year by Capt. R. F. McConnell who has been relieved by Comdr. Alan G. Kirk.

Hon. Harry H. Woodring was appointed (September 26th) Secretary of War to fill the vacancy caused by the death of Hon. George H. Dern. Mr. Woodring has been the Assistant Secretary of War since April 6, 1933. Secretary Woodring served with the Tank Corps during the World War. He was governor of Kansas, 1931-1933, and is a past state commander of the American Legion.

The War Department refused permission to Alexander P. deSeversky to fly his low-wing all-metal pursuit ship in the Bendix Trophy race due to features of the plane considered to be a military secret. The Department has recently contracted for eighty-five of these ships.

THE Navy will seek to provide for an increase of 5000 men in its enlisted strength in next year's budget. One aircraft carrier and six cruisers now building are scheduled to join the fleet during the fiscal year 1938, necessitating an increase in enlisted strength, since none of the ships is a replacement. The Bureau of Navigation estimates that a total strength of 105,000 men will be necessary for this enlarged Navy. In comparison, the Army will attain an enlisted strength of 165,000 by June 30, 1937.

A War Department contract, totaling $329,659, for fifty primary training planes has been awarded to the Stearman Aircraft Company of Wichita, Kan. In competitive tests conducted by the Matériel Division of the Air Corps at Wright Field, Ohio, the experimental model showed great efficiency. Specifications for this type of craft demand a speed of 125 miles per hour with a reduced cruising speed of 105 miles per hour and the capability of climbing to 10,000 feet with full load in eighteen minutes. The plane is powered with one 225-horsepower, 7-cylinder, air-cooled Lycoming engine.

The Office of the Assistant Secretary of War has announced also the award of a contract for 150 Wright Cyclone aircraft engines to the Wright Aëronautical Corporation of Paterson, N. J. The amount of the contract is $1,327,190. The engines, of the single-row, radial, air-cooled type, will be used to power the new Douglas Bombers of the Army Air Corps. The engine develops 1000 horsepower for take-off—a two-speed supercharger with a gear-shift mechanism making possible high power at take-off without sacrificing high-altitude performance. Other features of the new motor are: increased cooling area, full-pressure air deflectors, drives for operating all navigating instruments of the latest type, including robot pilot, and a dynamic damper crank shaft counterweight to eliminate torsional vibration, so damaging to aircraft engines.

Book Reviews

PROCESSING AND FINISHING COTTONS. By Col. James F. Monaghan, Ord. Res. Boston: Frank P. Bennett & Co., Inc. 1936. $12.00.

THERE are two very good reasons why this monumental work should appeal to many readers of ARMY ORDNANCE. In the first place, any authoritative discussion of the proper processing of cotton linters and the nitration of cellulose is of inestimable value to all who are concerned with the production of smokeless powder both in peace and in war. In the second place the author, who has an established reputation as one of the country's leading authorities on all phases of processing and finishing cottons, has long been identified with the Ordnance Department as a Reserve officer.

In these volumes he presents a complete discussion of the entire subject which can well serve as a textbook both for the novice and the experienced cotton finisher. The table of contents disclose an encyclopedic coverage. The more than 1000 pages of text include 128 explanatory illustrations, 152 finishing formulae and recipes, much of which is material not published in any other book.

This text is especially valuable from the Ordnance standpoint. Chapters XIX and XX on the Processing of Linters and the Nitration of Cellulose, respectively, are pertinent and timely for the actual or prospective maker of smokeless powder. Six chapters (XIII to XVIII) are a thorough and authentic treatment of bleaching cotton (cellulose). The entire discussion of these chapters is applicable to the purification of cotton linters and cotton for smokeless powder manufacture.

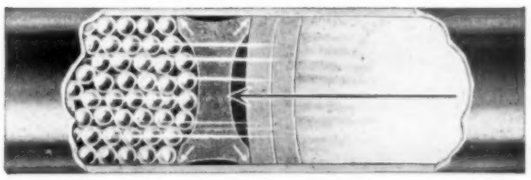
For the broader technique of bleaching, dyeing and finishing, Colonel Monaghan's treatise should be of inestimable value to the industry. Certainly so far as those phases of the subject which relate to the Ordnance program are concerned, we welcome this volume as a worthy and long-desired addition to our technical-military literature and we compliment the author upon this latest evidence of his painstaking zeal. He has already proved himself a competent and energetic leader in the cotton finishing industry and in the Ordnance cause. Both are fortunate in the availability of his text.

O. E. D.

M-DAY. By Rose M. Stein. New York: Harcourt, Brace & Co. 1936.

"BY a series of successive steps, American business forced the country to enter the World War. The die was cast when on the first day of August, 1914, all the partners of J. P. Morgan & Co. 'were heart and soul for the Allies.' The first step was aquiescence to the blockade and acceptance of the proposition to sell to only one of the belligerents. The next step was to ratify loans with which to pay for American goods delivered to the Allies. The final step was taken to save the loans and consequent collapse of American and world credit. Each step was taken by the Government reluctantly but was forced upon it as a condition for maintaining productive activity and economic prosperity."

This quotation is the opening paragraph or "argument," in Miss Stein's book "M-Day." She then devotes almost four hundred pages to proving this thesis, showing how defective were our industrial operations during the World War and



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how faulty are our plans for industrial activities during the next war, claiming that the proposals of the Nye Munitions Committee of the U. S. Senate are the only sound measures to take profits out of wars and consequently to end all wars.

Miss Stein was closely associated with Senator Nye's committee and had the task of preparing an official summary of the testimony. She must have had an unusual opportunity to study the testimony, the facts, the documents, and other items of evidence which this committee had brought before it. Her position was such that no question can be raised as to the authenticity of the statements of witnesses, extracts from official documents, and other quotations which appear in such numbers in the book. However, an unbiased reader is impressed with the vigor of Miss Stein's beliefs and the way extracts are selected so as to express just so much of the whole story as is favorable to her contentions.

Miss Stein echoes the opinions of Senator Nye and his associates on his Munitions Committee when she argues that industrialists dominated the United States during the World War. That may be true, but one must question the motives which, it is claimed, actuated them. It is stated that "industry proceeded to devise various means for entrenching a civilian supercabinet. Among the latter preparedness efforts, the chief activities consisted of creating the Naval Consulting Board and the Council of National Defense, the conduct of an industrial survey and the report of the Kernan Board which aimed to forestall attempts to nationalize the munitions industry."

The author concedes that the Army had something to do with the World War activities but it was actuated by purely selfish motives because "only in war can officers achieve promotion or attain to prominence, contemporarily or historically." And further, it is implied that in the Army's procurement activities, financial gains through dividends from munitions manufacturing corporations in which they were stockholders or with which they had been previously connected were the chief reasons for those officers' actions.

While the facts as stated by Miss Stein may be true, one is not impressed with the author's efforts to make sure that she is presenting the whole truth. An intelligent reader cannot accept the implication that, except for a few elected legislators and their selected assistants, all other governmental officials are entirely selfish and motivated by only personal greed and financial gain. It is hard to agree with the recommendations of the Nye Committee in the hope that a few months of political investigation will produce results more worth while than those achieved through years of intensive study. No evidence is produced to show that, by some divine dispensation, all honor, virtue, honesty and integrity are concentrated in the Nye Committee personnel and those whom they would select to operate our munitions manufacturing plants in the next war.

The book is well arranged and well written, with a wealth of facts and information which must, unfortunately, be accepted with discretion because of their incompleteness. As an argument, it is too patently prejudiced. It is, however, a splendid example of the extent to which facts, statements and documents may be selected, extracted, suppressed, and distorted to prove a point. R. M.

A HISTORY OF THE UNITED STATES NAVY. By Dudley W. Knox, Captain, U. S. Navy. New York: G. P. Putnam's Sons. 1936. $5.00.

CAPTAIN KNOX, the author of this brilliant work, needs no introduction to readers of ARMY ORDNANCE. He has contributed to these pages on several occasions. Among archivists of the American Navy he stands supreme as a student, analyst, and commentator of our naval tradition and of its possible future application. Quite naturally, then, we approach this

volume expecting a painstakingly accurate and sufficiently comprehensive treatment of the subject. Now that the book has been read, we truthfully admit no disappointment but rather a feeling of real satisfaction and consequently of praise for a great work well done.

The scope and purpose of the author's researches are aptly described in the introduction by Vice Adm. William L. Rodgers, U.S.N., Ret., who appraises this history both for its matter and form. For ourselves it is a matter of highest importance that a work of this nature appears when far too many of our people do not seem to understand the strategy and tactics of the American Navy in relation to our naval policy and our international security. Thus, to have a factual chronicle of events as Captain Knox sets them forth from the very beginnings of our Navy to the present day, is an achievement doubly appropriate now. This historian has the happy faculty of offering stimulating comment on our naval operations—comment fortified by strong logic.

It would be quite impossible within the confines of this review to elaborate the comprehensive plan which Captain Knox follows faithfully from October 13, 1775, when John Adams established our Navy's legislative birthday, to the abrogation of the Nine Power Treaty in 1936. In all this span of 161 years Captain Knox has not missed a high light. The volume is well documented and well indexed and represents the last word in the complete history of the United States Navy.

The time has come when every real American must know something of the history, the strategical importance and the political significance of the military and naval forces of the United States. From the Army standpoint, Lieut. Col. William A. Ganoe rendered conspicuous service with his "History of the Army of the United States" in 1924. Now, with this fitting companion piece by Captain Knox, the complete story exists in easy form that he who runs may read. Nothing finer could happen than that every one of our millions of citizens should know these two books as well for their record of valor as for their significance to what we as a nation have been, what we are, and what we must be if we are to remain American.

L. A. C.

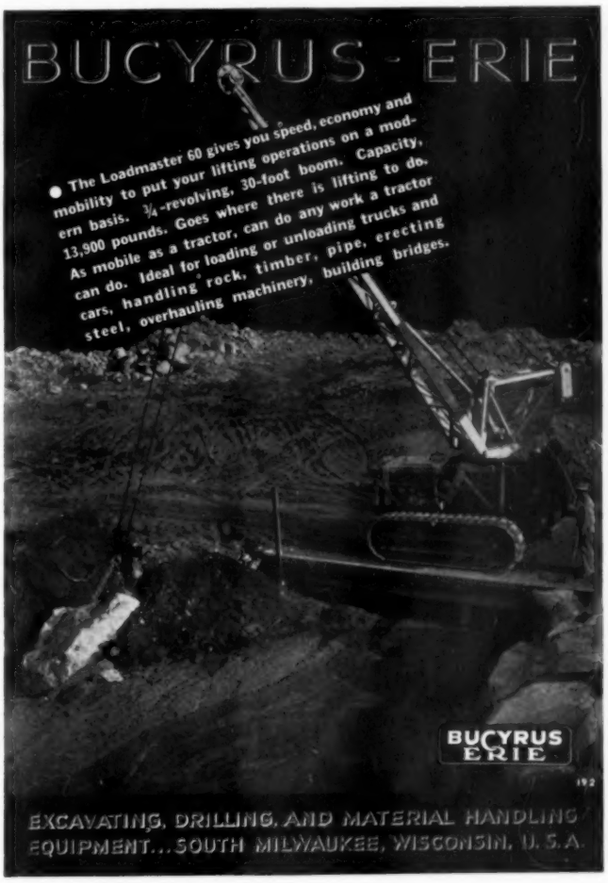
WITH PERSHING IN MEXICO. By H. A. Toulmin, Jr. Harrisburg, Pa.: The Military Service Publishing Co. 1935.

HAVING served throughout the active part of Pershing's Punitive Expedition in Mexico in 1916, I picked up this book with a lively interest. My appetite was further whetted by the foreword which, among other things, says, ". . . . this book, through the labor of its author, has portrayed the real conditions that were present by balancing factors and weighing considerations in such a way that the interested reader may form a conclusion and judgment, first, as to the success or otherwise of the campaign, and second, what substitutions or additions to present day scientific and mechanical developments might have made it more successful."

To my disappointment, I found the book a more or less disjointed series of sketchy accounts of some of the more important phases of the expedition. These accounts are not even arranged in the correct chronological order and are so incomplete as to tell nothing to the informed reader and perhaps to mislead the uninformed reader.

The final chapter is devoted to a discussion of mechanized warfare and a defective description of the equipment of the mechanized cavalry of the United States Army. Here again much is sketchy, misleading and incomplete, such as the statement that a modern motorized infantry division may have a column of from one hundred to two hundred miles in length!

To the military reader this book has little to offer, and to the nonmilitary reader it is misleading because incomplete. R. M.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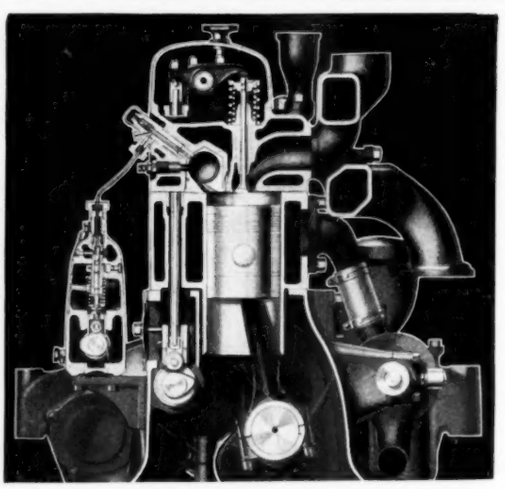

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REDEDICATION

THIS is the one-hundredth issue of ARMY ORDNANCE. As magazines go, the one-hundredth issue is not usually worthy of special note. However, for a bimonthly such as this, requiring sixteen and two-thirds years to reach that distinction, the milestone becomes a measure of an extended period of time. But the chief significance lies in the measure of progress of our national defense between that day in July, 1920, when this magazine first appeared, and today—the threshold of 1937.

This journal was founded by the Army Ordnance Association and dedicated to the purposes for which the Association itself was projected: "Industrial Preparedness as one of our nation's strongest guaranties of peace". From this purpose the Association and journal never have deviated. With truth can it be said that ARMY ORDNANCE has assisted in some measure in keeping the science and art of ordnance before an interested forum; it has reflected the views of qualified thinkers on armament and allied phases of America's national defense. In its articles it has presented facts which most Americans would do well to know, to remember, and to act upon. In its editorial expressions it has tried honestly and fearlessly to expound the principles of a sound national defense. Each task to be done at the moment was done, and all who have contributed in the slightest have merited a lasting reward, an acknowledgment which applies especially to our members, our authors, our advertisers.

The important thing is not the hundred issues that are gone. They may be, and we hope they will be of value if the stark reality of war ever comes upon us again. Assuming that the loyal band of old friends will carry on and that as the ravages of time thin their ranks others will come forward to help keep alive that concern for our weapons of defense which is so essential to our national well-being—assuming, in a word, that the future will be as kind and gracious as the past has been, ARMY ORDNANCE looks ahead. In a spirit of confidence and gratitude, and with a realization of its increasing value, all members of our Association can join in this rededication of their bimonthly journal to the sound principles and sane doctrines for which it has stood from its beginning.

Let us hope that a modification of the saying applies: "The first hundred issues are the hardest." Whether the road ahead be serene or turbulent, whether it run on indefinitely through pleasant pastures or through fields of battle, or even perchance if it come to a dead end, ARMY ORDNANCE, in this fleeting glance at the hundredth milestone, steps forward, its head up, its tread steady, with but one major ideal—the one with which it started—Industrial Preparedness for the National Defense of the United States.